THE UNIVERSITY OF MANITOBA

# HIGH SCHOOL GRADES AS PREDICTORS OF SUCCESS IN FIRST YEAR UNIVERSITY AS DETERMINED BY A STUDY OF THE CORRELATION OF THE UNIVERSITY GRADE POINT AVERAGES WITH DEPARTMENT OF EDUCATION AND COLLEGIATE MARKS

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A THESIS

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OF THE REQUIREMENTS FOR THE DEGREE

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BY

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## ABSTRACT

The purpose of this study was to arrive at tentative answers to the following two questions:

1. Is there a significant relationship between the correlation coefficient which results from a comparison of the achievement in Grade XII as measured by school marks with the first year university grade point average and the correlation coefficient which results from a comparison of achievement on departmental examinations in Grade XII with the first year university grade point average?

2. Is academic achievement as measured by school marks in Grade XII of value in predicting success in the first year of university work?

The two groups of students investigated in this study were enrolled in the secondary schools of one school division in suburban Winnipeg. The academic achievement in Grade XII of the first group of students studied was influenced by provincial examination standards. The academic achievement in Grade XII of the second group of students studied was based on satisfactory performance as certified by the school after the influence of provincial examination standards was totally removed.

The principal findings of this study were as follows:

1. Correlations of the first year university grade point average with student achievement in Grade XII as measured by marks certified by the high school and with student achievement in Grade XII on departmental examinations, when applied to the Grade XII average and the grades in individual Grade XII subjects, showed relationships favoring school marks with one exception, marks in English on departmental examinations.

2. Neither the achievement in Grade XII as measured by school marks nor the achievement in Grade XII as measured by departmental examinations correlated highly with the first year university grade point average nor was the difference between them significant.

3. The calculation of the correlation coefficient indicated a much higher degree of relationship between the first year university grade point average and the Grade XII academic record after the influence of provincial examination standards was totally removed.

Because of these results the following conclusions were reached:

1. Under the influence of provincial examination standards, there is no significant difference between the correlation coefficients which result from a comparison of the first year university grade point average with achievement in Grade XII as measured by school marks, and with achievement in Grade XII as measured by departmental examinations.

2. The correlation coefficient is of value in predicting the first year university grade point average from a knowledge of the Grade XII academic record as certified by the high school.

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# CHAPTER I

## INTRODUCTION

In recent years educators in the academic disciplines have stressed that emphasis in the schools should be placed on critical thinking, inquiry, experimentation, and exploration rather than on the assimilation of certain bodies of knowledge. With educational psychologists stressing the importance of individual differences among students, flexibility of the curriculum was seen as a means of providing for differences in ability and interest.

Since the individual secondary school often possesses the knowledge and experience required to determine local student needs and interests, local educational authorities have been assigned the responsibility of designing a curriculum which will best meet the needs of their students. Therefore, the practice of determining student promotions in the secondary schools of Manitoba on the basis of a written set of externally set and graded examinations became increasingly questionable. The most serious general criticism of the use of these examinations as a means of determining student promotions was that they tended to impose rigid course requirements on the teachers who prepared students for such examinations. Thus, the practice of determining student promotions on the basis of a written set of departmental examinations was gradually phased out in the secondary schools of Manitoba. In accordance, the University of Manitoba admission requirements were modified.

By September, 1969, Grade XII students seeking admission to the University of Manitoba were required to fulfill the general entrance requirements of standing in five different Grade XII subjects, three subjects with Board Standing and two other subjects with either Board Standing or School Standing. More specifically, Board Standing referred to satisfactory performance on examinations set and graded under the auspices of the High School Examination Board. School Standing referred to satisfactory performance in the subjects as certified by the students' high school.

Upon recommendation of the Manitoba Teachers' Society and the Curriculum Branch of the Manitoba Department of Education, departmental examinations in Grade XII were written for the last time in June, 1970. In accordance, the general entrance requirements of the University of Manitoba were further modified and commencing in September, 1971, Manitoba high school students were admitted to the University of Manitoba on the basis of School Standing in five different Grade XII subjects.

In the secondary schools one of the main purposes of the university matriculation programmes is to prepare students for university work. To do otherwise would be to prepare the students in such a way that they would encounter hardship and failure in their post-secondary work. An ever increasing number of students

are choosing to pursue post-secondary education. According to Press reports "the 1971- 72 enrollment at the University of Manitoba increased by 5.5 per cent from the previous year."[1] The high cost of post-secondary education makes necessary the development of devices that will predict success at the university. Furthermore, it is felt that a student who finds himself unable to cope with university work and who has to leave by his own choice or due to the advice of the university authorities experiences a sense of frustration which may have serious adverse effects on his future life.

In the past, departmental examinations were used as the basis for university admission. They provided a basis for comparing the academic achievement of students from all parts of the province. A problem associated with the use of school marks alone for admission to university is that they do not provide a standard and common basis for comparing students. Marks or standings from different schools are usually not comparable because of the unavoidable differences in the standards each espouses. "Despite the fact that

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[1] Winnipeg Free Press, January 18, 1972

teachers' marks can be very reliable, the standards applied by one teacher may differ from the standards applied by another. In some instances the discrepancy may be large enough to substantially effect the marks students receive."[2] Consequently, little is known about the relationship between school marks in Grade XII and success at the university.

Statement of the Problem

It was the purpose of this study to arrive at tentative answers to the following two questions:

1. Is there a significant difference between the correlation coefficient which results from a comparison of the achievement in Grade XII as measured by school marks with the first year university grade point average and the correlation coefficient which results from a comparison of achievement on departmental examinations in Grade XII with the first year university grade point average?
2. Is academic achievement as measured by school marks in Grade XII of value in predicting success in the first year of university work?

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[2] Traub, Ross E., "Reflections on Some Popular Criticisms of University Entrance Examinations", The Bulletin, Volume 49, No. 2, March, 1969, p. 100

Significance of the Problem

The answers to the stated questions could be of great benefit to educational authorities, school administrators, and students. School superintendents, school boards, and school principals could use such information to determine their schools' sensitivity to changes in the examining procedures of colleges and universities and thereby adjust their examining procedures appropriately.

Such information could be used by educational administrators to determine whether school marks alone are sufficient to determine admissions to the university. However, such recommendations would follow research on a much wider scale than is possible in a local study of the kind attempted in this thesis.

Such information could be used by guidance counsellors in helping students and their parents reach decisions about post-secondary studies. Thus, students who are only marginally successful in Grade XII or whose interest in university studies is only slight could make the necessary mental adjustments for a rewarding effort in an area better suited to their needs. In this way the student would be spared the frustration of failure and financial loss attendant with failure at the university.

A study such as this has immediate value. It provides information which educational administrators may use to evaluate the effectiveness of the university matriculation programmes in

their schools. Students may use such information to examine their academic status and aspirations before making decisions about post-secondary studies.

## Definitions, Assumptions, Limitations

### Definitions

1. Departmental examinations. The term departmental examinations refers to examinations set for the Department of Education by a committee of high school teachers and university professors. Such examinations were usually marked externally at a central point by a committee of markers appointed by the Department of Education.

2. Board Standing. This term refers to satisfactory performance, a mark of not less than 50 per cent on a departmental examination.

3. School Standing. This term refers to satisfactory performance in a subject, a mark of not less than 50 per cent, as certified by the students' high school and based on term work and examinations.

4. High School Examination Board. This was a committee of high school teachers and university professors who were responsible for setting the departmental examinations.

5. School Marks. For the purposes of this study this term will refer to a level of academic performance in a subject as certified

by the students' high school and based on term work and examinations.

6. Success at the University. For the purposes of this study this term will denote a 2.0 grade point average on a minimum of four courses. This figure was chosen as a measure of success since University policy requires an overall 2.0 grade point average in order for a candidate to qualify for graduation. The grade point average in the first year of university work is based on a minimum of twenty-four hours of credit.

Assumptions

Since Board Standing and School Standing in the Grade XII subjects were the deciding factor for admission to university, they were accepted as valid measures of academic achievement. It is further assumed that the population from which the samples were taken would be similar to and representative of other school divisions with secondary school enrolment between 900 and 1100 students. The situation that existed was also assumed to be similar to other high school centres with respect to the number of teachers, methods and results of instruction.

Limitations

Since the population from which the samples were taken was relatively small as evidence by the enrolment, 900 to 1100 students from Grade IX to XII, this thesis can be accepted only in situations of similar enrolment. Furthermore, it must also be borne in mind that this study was made in a suburban school

division of Winnipeg. No general inferences can be made from the processed data without reference to situations and conditions in areas similar to the one under study.

Further, it must be remembered that success at university is a result of many complex factors such as health, motivation, perseverance, time spent at study, and various personality factors to name but a few. Therefore, a study within the limits of marks and previous success alone has inherent limitations.

## CHAPTER II

## REVIEW OF THE LITERATURE

Success at university, usually defined in terms of adequate academic grades, is a function of the interaction of many complex factors, usually called predictors. This chapter consists of a discussion of some of the research dealing with prediction of academic success at the university level.

In a study by Endler and Snyder[3] both intellectual and non-intellectual factors in the prediction of academic achievement at the university were examined. Endler and Snyder hypothesized that such non-intellectual factors as religion, socio-economic status, and personality factors would be significant predictors of first-year college final grade averages and individual subject grades. This study also attempted to measure the effectiveness of certain combinations of predictors through a multiple-correlation procedure. The total sample consisted of ninety-eight male and forty-five female first year college students all of whom had written the Ontario Grade 13 Senior Matriculation Examinations. The predictors for this study included the high school average (HSA),

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[3] Endler, Norman S. and Snyder, Larry S., "An Examination of Some Intellectual and Non-Intellectual Factors in the Prediction of Academic Achievement at the University Level," Ontario Journal of Educational Research, Winter 1965, Volume 7, No. 2, p. 147-154

the School and College Ability Test (SCAT) Form IC, Form IB of the Sequential Tests of Educational Progress (STEP), the Test Anxiety Questionnaire (TAQ), the Generalized Anxiety Questionnaire (GAQ), the S-R Inventory Anxiousness, and an Individual Information Inventory. The criteria for academic performance were the first year college grade average (FGA) and the final grades in individual subject courses.

The principal findings of this study were:

1. The best single predictor of FGA and individual course grades was HSA. The HSA-FGA correlation was .56 for males and .70 for females.

2. Among the aptitude and achievement tests, the best predictors were STEP Reading and SCAT Verbal, but appeared to be unstable as predictors of both individual college course grades and FGA.

3. A comparison of HSA and FGA indicated that the higher the HSA, the greater the probability of a student achieving a passing grade during the first year at college.

4. Both sexes showed a significant drop in performance from the high school to the college level.

5. Students who completed Grade 13 in one year performed better at college than those who required more than one year to complete Grade 13.

6. Socio-economic status and birth order were not related to HSA, FGA, or SCAT aptitude.

7. Students who participated mainly in non-athletic activities in high school had a significantly higher HSA than did those who engaged primarily in athletics.

8. Multiple correlations employing various combinations of aptitude, achievement, and personality measures did not significantly raise the predictability of the FGA criterion.

9. In general, intellectual and verbal factors are better predictors of academic success than either personal or social factors.

In 1967, Conklin and Ogston[4] conducted a study at the University of Calgary in an attempt to identify variables related to first year university success. During registration week of the 1966-67 academic year freshmen students at the University of Calgary were required to complete a battery of various achievement, intellectual and personality scales. The students appeared for testing according to a schedule based on alphabetical order of their surnames. Six separate groups of students were tested at different sessions throughout the week and each group was given a test battery of somewhat different composition. In addition, each student's high school

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[4] Conklin, R.C. and Ogston, D.G., "Prediction of Academic Success for Freshman at the University of Calgary," Alberta Journal of Educational Research, September, 1968, Volume XIV, No. 3, pp. 185-191

average on Grade XII departmental examinations was obtained. The psychometric instruments included the Cooperative Academic Ability Test (CAAT), the Cooperative English Test (CET), the California Study Methods Survey (CSMS), the Eysenck Personality Inventory (EPI), the Costello-Comrey Need Achievement Scales, the Taylor Manifest Anxiety Scale, the Internal-External Control of Reinforcement, and the Pittsburgh Scales of Social Extraversion-Introversion and Emotionality. Students were then followed up at the end of their first year at university and the relationships between all these variables including the high school average, and the first year university average were studied. Complete data was available for 639 students.

Means, standard deviations, and intercorrelations were obtained from all variables for each of the six samples. Linear step-wise regression analysis was also computed. The results of the intercorrelation analysis indicated that the correlation of high school average and freshman success was consistently higher than the correlation of any other variable with the criterion. Correlation coefficients between high school average and first year university average ranged from .34 to .60, the median being .49. The only other test which, when correlated with the criterion, produced correlations approaching those for the high school average and freshman success was the CET. These coefficients ranged from

.23 to .57, the median being .41. Conklin and Ogston concluded that after high school average is known, psychological tests add little to the effectiveness of predicting the first year university average.

Endler and Steinberg[5] conducted a study to determine the role of the ability factor, aptitude, and previous achievement in the academic achievement of students at the university level. They also compared the college academic achievement of males and females. The sample consisted of the entire first year student population of a newly established liberal arts university in Ontario. Upon entrance to the university the students were administered the Cooperative School and College Test (SCAT) Form IC, and three of the Sequential Tests of Educational Progress (STEP, Form IB of Mathematics, Reading and Writing. These tests and the students' Grade 13 High School Average (HSA) were the predictors of academic achievement employed in the study. The predicted criteria were the first year college Final Grade Average (FGA) and the grades in individual subject courses.

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[5] Endler, Norman S. and Steinberg, Danny, "Prediction of Academic Achievement at the University Level," Personnel and Guidance Journal, April 1963, Volume 41, No. 8, pp. 694-699

The principal findings of this study were:

1. The best predictor of FGA and individual college course grades was HSA.

2. Among the aptitude and achievement tests the best predictors of FGA were STEP Reading, SCAT Verbal and SCAT total.

3. Multiple correlations employing the HSA, STEP Reading, SCAT Verbal, and SCAT Total predictors did not significantly raise the predictability of the FGA criterion.

4. Females had a significantly higher first year college final grade average than males although they did not suffer appreciably on their high school performance and college aptitude (SCAT Total).

5. Males showed a significant drop in performance from the high school to the college level while females did not.

6. Females were more predictable than males in that correlations between predictors and FGA were higher for females than males.

Donald B. Black[6] compared performance on Grade IX departmental examinations, on Grade XII departmental examinations, and on selected standardized tests with University Freshman Average. The study consisted of 529 matriculants of the 1956 Grade XII class who entered the University of Alberta in Edmonton as freshmen in the fall of that year. This particular class had been chosen to make

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6 Black, Donald B., "A Comparison of the Performance on Selected Standardized Tests to That on the Alberta Grade XII Departmental Examinations of a Select Group of University of Alberta Freshmen," Alberta Journal of Educational Research, September, 1959, Volume 5, No. 3, pp. 180 - 190

use of the data resulting from a special testing program conducted in Grade XII classes throughout the Province of Alberta in May 1956. It provided that every 1956 Grade XII student would write the School and College Ability Test Level I (SCAT I), the College Entrance Examination Board (CEEB), Scholastic Aptitude Test (SAT), and two CEEB subject area achievement tests corresponding to two Grade XII departmental examination subjects being taken by the student concerned. The sampling and assignment of test pairs was made using the Department of Education IBM class registration cards for the 1956 Grade XII class. Distribution of all tests was conducted by the Department of Education. All CEEB tests were scored by the Educational Testing Service and the score reported to the Department of Education.

Black chose the University Freshman Average as the criterion with which to compare the various instruments under examination. Correlations with the University Average with the CEEB and the corresponding departmental examinations revealed relationships favoring departmental examinations with one exception, CEEB English. However, neither the CEEB nor the departmental examination correlated highly with the University Average nor was the difference between them significant. Black found that in terms of predicting University Average, SAT, Cooperative SCAT, Cooperative ACE, and the Grade IX departmental examinations ranked behind CEEB in that order.

In 1965, James M. Richards, Jr., John L. Holland and Sandra W. Lutz[7] conducted a study at the University of Iowa designed to predict the academic and non-academic achievements of college students. The predictive variables included the American College testing battery (ACT), high school grades and extracurricular achievement record. The criterion variables were college grades and the nonclassroom achievement record. The survey was based on several years of college entrants.

The median correlation between grades in high school and grades in college was found to be about .38. ACT scores and college grades showed a median correlation of about .29. Student nonacademic accomplishment in high school and in college showed a median correlation of about .39. In general, the most consistently high predictor of academic and non-academic achievement in college is in the previous high school record.

Bert L. Sharp[8] compared the relationship of the number of years of study of a particular subject in high school and college

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[7] James M. Richards, Jr., John L. Holland and Sandra W. Lutz, "Prediction of Student Accomplishment in College," Journal of Educational Psychology, 1967, Volume 58, No. 6, pp. 343-355

[8] Sharp, Bert L., "College Achievement: Its Relationship to High School Achievement Experiences and Test Scores," Personnel and Guidance Journal, November 1962, Volume 41, No. 3, pp. 247-250

placement test scores for that subject area, and between these factors and college achievement as measured by first year college grades in that subject area. The study investigated these relationships for the four subject areas: English, Social Studies, Science and Mathematics.

The results of the study showed a significant relationship between the amount (one to four years) of high school study and placement test scores for the subject areas of Social Studies, Science and Mathematics. The analysis did not indicate a significant relationship for English and these factors. It was found that no significant relationship existed between the amount of study measured in years, which a student takes in a particular subject in high school and the grade that a student achieves in the same subject in the first year of college when level of performance on the placement tests is controlled. A significant relationship was found to exist between a composite score from all placement test scores and first year college grade point averages.

In a study entitled "High School Averages and Supplementals as Predictors of First Year University Success," Harold Pollock[9] attempted to establish whether a significant difference existed between students obtaining a clear pass and students passing on supplementals. It was found that the proportion of successful students

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[9] Pollock, Harold, "High School Averages and Supplementals as Predictors of First Year University Success," (Unpublished Master's Thesis, University of Manitoba, Winnipeg, 1959)

in the first year of university work is directly related to the presence or absence of supplementals in the preceding high school year. The knowledge of previous supplementals increased the accuracy of the prediction of failure by 32.6% but this was almost entirely confined to the group of students with averages of sixty or more. It was also found that the highest percentage of failures in the first year of university work occurs in the groups of students having less than sixty average regardless of the previous record of supplementals.

W. G. Fleming[10] in "Factors Affecting the Predictive Accuracy of the Ontario Grade XIII Results" found that the relationship between the Grade XIII and universities averages is closer for the students who obtain the Grade XIII standing required for university entrance within one year than for those who take longer. Some of the significant factors which effect the degree of relationship between the Grade XIII averages and university averages were the type of school, the economic level of the community where the school is located, the proportion of academic specialists on the staff, and

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[10] Fleming, W.G., "Factors Affecting the Predictive Accuracy of Ontario Grade XIII Results" Bulletin No. 16 Department of Educational Research, University of Toronto, Toronto, 1955, pp. 25 - 26

the current expenditure of the school board in terms of the average daily attendance.

Summary

The results of the foregoing investigations would seem to indicate that the high school record is the best single predictor of success or failure in the first year of university work. Studies by Endler and Synder showed that the high school average based on the Ontario Grade XIII Matriculation examinations was the best single predictor of first year college grades. Conklin and Ogston showed that the correlation of the high school average based on the Alberta Departmental Examinations and freshman grades at the University of Calgary were consistently higher than the correlation of various achievement, intellectual and personality scales with the same criterion. Endler and Steinberg showed that multiple correlations employing the high school average and various aptitude and achievement tests seemed to produce a slightly more accurate prediction of first year college grades than the high school average alone, but the raise in predictability was not significant. The study by Richards, Holland and Lutz indicated that non-intellectual predictor variables offer relatively no improvement in predictive measures over those provided by achievement and aptitude.

This review is only a brief summary of some of the literature relevant to this study. Much use was made of studies relating to academic achievement in the high school in relation to success at university. Former trends acted as guidelines for the format and

procedure to be used in this study. Other theses were particularly helpful in this area.

# CHAPTER III

## DESIGN OF THE SURVEY

### Introduction

The problem of the first phase of this study was to determine whether a significant difference existed between the correlation coefficient which resulted from a comparison of school achievement in Grade XII with the university grade point average and the correlation coefficient which resulted from a comparison of achievement on departmental examinations in Grade XII with the university grade point average. Students entering the University of Manitoba from a Manitoba high school in September, 1970 did so with a similarity of subject-matter background and having met, in at least three different Grade XII subjects, uniform examination standards influenced by the University itself. A study which would attempt to determine the effect, if any, of the removal of uniform examination standards in the high school on success at the university was considered of interest to the secondary schools and education in general.

The second phase of this study attempted to determine the predictive accuracy of the Grade XII academic record after the influence of provincial examination standards was totally removed. Commencing in September, 1971, students entering the University of Manitoba did so with a similarity of subject-matter background and having met the promotion standards of their high

school in a minimum of five different Grade XII subjects. A study which would attempt to determine whether academic achievement as measured by school marks in Grade XII is an accurate predictor of success at university was considered of interest to students, parents, teachers, and school administrators.

The Groups Studied

The two groups of students investigated in this study were enrolled in the secondary schools of one school division in suburban Winnipeg. The group of students investigated in the first phase of this study consisted of all the Grade XII students from this school division who were admitted to the University of Manitoba in September, 1970. During the 1969-70 academic year the Grade XII enrollment in the school division consisted of 191 students. In September, 1970, forty-two of these students were admitted to the University of Manitoba. For university admission purposes these students were required to present evidence of having successfully completed three Grade XII subjects with Board Standing and two other subjects with either Board Standing or School Standing. Each of these students obtained two sets of marks in June,1970. One set consisted of the marks as certified by the high school in each of the subjects in which the student was registered and one set consisted of the marks obtained on departmental examinations in the subjects which the student had elected to write.

The group of students investigated in the second phase of this study consisted of all the Grade XII students from this school division who were admitted to the University of Manitoba in September, 1971. During the 1970-71 academic year the Grade XII enrollment in the school division consisted of 184 students. In September, 1971, thirty-eight of these students were admitted to the University of Manitoba. These students were admitted to the University of Manitoba on the basis of satisfactory performance as certified by the high school in five different Grade XII subjects.

Recording the Data

The recording of the data began from the files of the School Board Offices. The information regarding each Grade XII student in the 1971 group was placed on prepared forms and included name, age, address, subject marks in Grade XII, and the average mark. The information regarding each student in the 1970 group was placed on similar forms but included two sets of Grade XII marks, the subject marks as certified by the students' high school and the subject marks obtained on departmental examinations. The average mark for both sets of marks was also recorded. The highest mark obtained in each subject was considered as the students' final mark when there was more than one mark resulting from the writing of supplementals or attendance at summer school.

When the Grade XII record had been completed for all the students, the forms were taken to the Registrar's Office, University of Manitoba, Fort Garry Campus and the first year university data was added. The first year university record consisted of the students' grade point average and the total number of attempted hours of credit. Only those students whose university record cards were filed at the Registrar's Office, University of Manitoba, Fort Garry Campus, were included in the study. Students whose university record was incomplete in terms of the number of attempted hours of credit or who withdrew from the university during the academic year were not included in the survey. Since according to present University of Manitoba regulations a student's performance is assessed in the first year of university work after twenty-four hours of attempted credit, only students who attempted a minimum of twenty-four hours of credit were included in this survey. According to these conditions forty students in the 1970 group and thirty-three students in the 1971 group had complete university records.

Detailed Outline of the Statistical Devices Used

As stated in the problem, the purpose of this study was to arrive at tentative answers to the following questions:

1. Is there a significant difference between the correlation coefficient which results from a comparison of the achievement in Grade XII as measured by school marks with the first year university grade point average and the correlation coefficient which results

from a comparison of achievement on departmental examinations in Grade XII with the first year university grade point average?

2. Is academic achievement as measured by school marks in Grade XII of value in predicting success in the first year of university work?

The first phase of this study therefore concerned itself with comparing the relationship between achievement on departmental examinations in Grade XII with the first year university grade point average and the relationship between school achievement in Grade XII with the first year university grade point average.

The first year university grade point averages and the Grade XII departmental examination scores were tabulated and statistically analyzed in terms of means, standard deviations, and correlation coefficients. The mean is a single score representative of all the scores within a group of scores. It is calculated by adding all of the scores and dividing by the number of scores. The standard deviation (SD) describes the variability of the scores within a group. It is commonly expressed as $SD=\sqrt{\frac{\sum d^2}{N}}$,[11] where d stands for the deviation from the mean and N stands for the number of persons in the group. The correlation coefficient (r)

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[11] Tyler, L.E. Tests and Measurements, Englewood Cliffs, N.J., Prentice-Hall, Inc., 1965, p. 18

is the mathematical statement of the relationship between two sets of scores. It is expressed by the formula $r = \frac{\Sigma dx\ dy}{N\ (SD_x)\ (SD_y)}$ [12] dx and dy stand for the deviation from the mean of the first set of scores and the second set of scores, respectively, and $SD_x$ and $SD_y$ stand for the standard deviation of the first set of scores and the second set of scores, respectively. If the relationship between two sets of scores is perfect then r will be 1.00. For all lesser degrees of relationship r will be a decimal number between -1.00 and 1.00. This statistical procedure was also carried out for the first year university grade point averages and achievement in Grade XII as measured by school marks.

In order to determine the significance of the difference between two correlation coefficients for correlated samples, a value t may be calculated by the following formula:

$$t = \frac{(r_{23} - r_{13}) \sqrt{(N-3)\ (1 + r_{12})}}{\sqrt{2\ (1 - r_{23}^2 - r_{13}^2 - r_{12}^2 + 2r_{12}r_{13}r_{23})}} \qquad 13$$

This expression follows the distribution of t with N-3 degrees of freedom, where N is the number of cases and $r_{23}$ stands for the

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12 Ibid., p. 19

13 Ferguson, George A., Statistical Analysis in Psychology and Education, McGraw-Hill Book Company, New York, 1970, p. 171

correlation coefficient between marks on departmental examinations in Grade XII and the first year university grade point average, $r_{13}$ stands for the correlation coefficient between marks in Grade XII as certified by the school and the first year university grade point average, and $r_{12}$ stands for the correlation coefficients between marks on departmental examinations in Grade XII and marks in Grade XII as certified by the school.

The test of significance for a difference between two statistics is the theory of the "null hypothesis."[14] In this study the null hypothesis assumes that no significant difference exists between the correlation coefficient which results from a comparison of academic achievement in Grade XII as measured by school marks with the first year university grade point average and the correlation coefficient which results from a comparison of achievement on departmental examinations in Grade XII with the first year university grade point average. In this study the null hypothesis may be written: $H_o : r_{23} = r_{13}$, where the symbol $H_o$ represents the null hypothesis, $r_{23}$ represents the correlation coefficient between marks on departmental examinations in Grade XII and the first year university

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[14] Ibid., p. 147

grade point average, and $r_{13}$ represents the correlation coefficient between marks in Grade XII as certified by the high school and the first year university grade point average. The probability level for rejecting the null hypothesis is low, usually .05 or lower. In this study if the value of t is statistically significant at the .05 level the null hypothesis will be rejected and it will be stated that there is a significant difference between the correlation coefficient which results from a comparison of academic achievement on departmental examinations in Grade XII with the first year university grade point average and the correlation coefficient which results from a comparison of academic achievement in Grade XII as measured by marks certified by the school with the first year university grade point average. The level at which the relationship between the two correlation coefficients is statistically significant can be read from the tables prepared by Fisher and Yates.[15]

The second phase of this study concerned itself with predicting the first year university grade point average from a knowledge of the academic achievement in Grade XII as measured by marks certified by the school. The first year university grade point averages and the Grade XII scores were tabulated and statistically analyzed in terms of means, standard deviations, and correlation coefficients. It is the presence of correlation or association

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[15] Ibid., p. 450

between two sets of variables that makes prediction possible and the accuracy of prediction depends on the relationship that exists. The greater the absolute value of the correlation between two sets of scores the more accurate the prediction of one variable from the other. Once the correlation coefficient has been computed it can be used to formulate a prediction formula or regression equation. The formula for the regression equation is given by:

$$Y^1 = My + \frac{SDy}{SDx} (r) (x - Mx)$$

where $Y^1$ is the predicted value of Y, SDy and SDx are the standard deviation of the Y and X scores, respectively, r is the correlation coefficient between the X and Y scores, x is the value for which we are predicting a value of Y, and My and Mx are the means of the Y and X scores, respectively.[16] The extent to which the predicted measure fails to correspond to the actual measure is indicated by 'the standard error of estimate' (Sy.x) and can be computed by using the formula $Sy.x = SDy\sqrt{1-r^2}$[17] where SDy is

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[16] Best, J.W., Research in Education, Prentice-Hall Inc., Englewood Cliffs, N.J. 1965, p. 233

[17] Edwards, Allen L., Statistical Analysis, Holt, Rinehart and Winston, Inc., New York, 1969, p.76

the standard deviation of the Y scores, and r is the correlation coefficient between the X and Y scores. The reduction in errors of prediction can be calculated by the use of 'the index of forecasting efficiency' E. It is given by the formula $E = 1 - \sqrt{1-r^2}$ [18] where again, r is the correlation coefficient between the X and Y scores.

Once the correlation coefficient between the university grade point averages and the Grade XII record had been calculated for this phase of the study it was used to determine whether knowledge of this factor increased the accuracy of predicting success at the university.

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18 Ibid., p. 77

# CHAPTER IV

## THE DATA AND ITS INTERPRETATION (GRADE XII CLASS OF 1970)

### Introduction

The data in the following chapter is based on all the students from one suburban Winnipeg School Division who presented standing to satisfy the entrance requirements for admission to the University of Manitoba during the 1970-1971 academic year and who attended the university for one full year. Each of these students obtained two sets of final marks in Grade XII; the marks they had scored on a minimum of three departmental examinations and the marks in each subject as certified by the individual's high school. The average mark as well as the subject marks obtained on departmental examinations by each student were computed, analysed, and statistically compared with the grade point average obtained by the same students in the first year of university work. The same procedure was carried out with the students' marks certified by the high school. The Monroe 770 calculator was used to assist in the calculations in this study.

The means, standard deviations, and correlation coefficients were calculated. In order to determine whether the correlation coefficient between marks scored on departmental examinations in Grade XII and the first year university grade point average differed significantly at the .05 level of significance from the correlation

coefficient obtained between marks in Grade XII as certified by the high school and the first year university grade point average the t test for the significance of the difference between two correlation coefficients for correlated samples was performed. The calculation of the means, standard deviations, and correlation coefficients for marks on departmental examinations in Grade XII and the first year university grade point averages, for marks in Grade XII as certified by the high school and the first year university grade point averages, and for marks in departmental examinations in Grade XII and marks in Grade XII as certified by the high school are shown in Tables I - XV, inclusive. The results are summarized in Tables XVI - XVIII, inclusive.

The t test of Significance of the Difference Between Two Correlation Coefficients for Correlated Samples

In order to observe whether an observed difference between two correlation coefficients is of such magnitude that it can not be attributed to factors of chance, the t test of significance is applied to the correlation coefficients under investigation. The "null hypothesis" or the hypothesis of no difference is tested and it is assumed that any observed difference is merely due to random chance.

The basic problem of this phase of the study was to determine if there was a significant difference between the correlation coefficient which resulted from a comparison of academic achievement on Departmental Examinations in Grade XII with the first year university grade point average and the correlation coefficient which resulted from a comparison of academic achievement in Grade XII as measured by school marks with the first year university grade point average. From the data summarized in Tables XV - XVII it is possible to determine whether the two correlation coefficients computed differ significantly. To carry out the test of the null hypothesis a value of t is calculated. The use of Table B, Appendix Tables[19] gives the value of t which would be required to meet the requirements of significance at the .05 level. The calculations necessary for the comparisons in terms of the t test follow.

1. Average marks on Departmental Examinations and the University G.P.A: $r_{23} = .316$

   Average High School marks and the University G.P.A: $r_{13} = .429$

   Average marks on Departmental Examinations and Average High School marks: $r_{12} = .632$

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19 Ibid., p. 450

$$t = \frac{(r_{23} - r_{13}) \sqrt{(N-3)\ (1 + r_{12})}}{\sqrt{2\ (1 - r_{23}^2 - r_{13}^2 - r_{12}^2 + 2\ r_{12}r_{13}r_{23}\ )}}$$

$$t = \frac{(.316 - .469) \sqrt{(40 - 3)\ (1 + .632)}}{\sqrt{2\ (1 - .316^2 - .469^2 - .632^2 + 2\ (.632)\ (.469)\ (.316)}} = 1.228$$

For degrees of freedom equal to 37 a t of about 2.027 (Table B, Appendix[20]) is required for significance at the five per cent level. In consequence, we conclude that the correlation coefficient between Average marks on Departmental Examinations and the first year university grade point average and the correlation coefficient between Average marks as measured by the high school and the first year university grade point average are not significantly different.

2. English marks on Departmental Examinations and the University G.P.A: $r_{23} = .288$

High School English marks and the University G.P.A: $r_{13} = .097$

English marks on Departmental Examinations and High School English marks: $r_{12} = .134$

$$t = \frac{(r_{23} - r_{13}) \sqrt{(N-3)\ (1 + r_{12}\ )}}{\sqrt{2\ (1 - r_{23}^2 - r_{13}^2 - r_{12}^2 + 2\ r_{12}\ r_{13}\ r_{13})}}$$

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20 Ibid., p. 450

$$t = \frac{(.288 - .097)\ \sqrt{(31 - 3)\ (1 + .134)}}{\sqrt{2\ (1 - .288^2 - .097^2 - .134^2 + 2\ (.288)\ (.097)\ (.134)}} = .804$$

For degrees of freedom equal to 28 a t value of 2.048 is required for significance at the 5 per cent level. Thus, a value of .804 indicates that the correlation coefficient between English marks on Departmental Examinations and the first year university grade point average and the correlation coefficient between English marks as measured by the high school and the first year university grade point average do not differ significantly.

3. Mathematics marks on Departmental Examinations and the University G.P.A: $r_{23} = .166$

High School Mathematics marks and the University G.P.A: $r_{13} = .255$

Mathematics marks on Departmental Examinations and High School Mathematics marks: $r_{12} = .625$

$$t = \frac{(r_{23} - r_{13})\ \sqrt{(N-3)\ (1 + r_{12})}}{\sqrt{2\ (1-r_{23}^2 - r_{13}^2 - r_{12}^2 + 2\ r_{12}\ r_{13}\ r_{23}\ )}}$$

$$t = \frac{(.255 - .166)\ \sqrt{(24 - 3)\ (1 + .625)}}{\sqrt{2\ (1- .255^2 - .166^2 - .625^2 + 2\ (.625\ )\ (.166)\ (.255)}} = .487$$

For degrees of freedom equal to 21 a t value of 2.080 is required for significance at the 5 per cent level. The obtained value of t in the present case is .487 which indicates that the

correlation coefficient between Mathematics marks on Departmental Examinations and the first year university grade point average and the correlation coefficient between Mathematics marks as measured by the high school and the first year university grade point average are not significantly different.

4. Chemistry marks on Departmental Examinations and the University G.P.A: $r_{23} = .313$

High School Chemistry marks and the University G.P.A: $r_{13} = .372$

Chemistry marks on Departmental Examinations and High School Chemistry marks: $r_{12} = .704$

$$t = \frac{(r_{23} - r_{13}) \sqrt{(N-3)(1 + r_{12})}}{2(1 - r_{23}^2 - r_{13}^2 - r_{12}^2 + 2 r_{12} r_{13} r_{23})}$$

$$t = \frac{(.372 - .313) \sqrt{(22 - 3)(1 + .704)}}{\sqrt{2(1 - .313^2 - .372^2 - .704^2 + 2(.704)(.372)(.313)}} = .361$$

For degrees of freedom equal to 19 a t value of 2.093 would be required in order for the difference between the two correlation coefficients to be significant at the 5 per cent level. Thus a t value of .361 indicates that there is no significant difference between the correlation coefficient which results from a comparison of achievement in Chemistry on Departmental Examinations with the first year university grade point average and the correlation coefficients which results

from a comparison of achievement in Chemistry as measured by high school marks with the first year university grade point average.

5. French marks on Departmental Examinations and the University G.P.A: $r_{23} = .506$

High School French marks and the University G.P.A: $r_{13} = .526$

French marks on Departmental Examinations and High School French marks: $r_{12} = .882$

$$t = \frac{(r_{23} - r_{13}) \sqrt{(N-3)(1 + r_{12})}}{\sqrt{2 (1 - r_{23}^2 - r_{13}^2 - r_{12}^2 + 2 r_{12} r_{13} r_{23})}}$$

$$t = \frac{(.526 - .506) \sqrt{(19 - 3)(1 + .882)}}{\sqrt{2 (1 - .506^2 - .526^2 - .882^2 + 2 (.882)(.526)(.506))}} = .195$$

For degrees of freedom equal to 16 a t value of 2.120 is required for significance at the 5 per cent level. The obtained value of t in the present case was .195 which indicates that there is no significant difference between the correlation coefficient which results from a comparison of achievement in French on Departmental Examinations with the first year university grade point average and the correlation coefficient which results from a comparison of achievement in French as measured by high school marks with the first year university grade point average.

The foregoing tests of significance have indicated that there is no significant difference between the correlation coefficient which resulted from a comparison of achievement on Departmental Examinations in Grade XII with the first year university grade point average and the correlation coefficient which resulted from a comparison of achievement in Grade XII as measured by high school marks with the first year university grade point average.

Table XIX shows, in summary, the results of the t test of significance. An obtained difference lower than the given value of t would indicate that the observed differences were most likely to occur by random chance.

TABLE I

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF THE GRADE XII AVERAGE OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 56.8 | 1.15 | -5.1 | -1.20 | 26.01 | 1.4400 | 6.120 |
| 2 | 57.4 | 2.00 | -4.5 | -0.35 | 20.25 | .1225 | 1.575 |
| 3 | 54.0 | 1.80 | -7.9 | -0.55 | 62.41 | .3025 | 4.345 |
| 4 | 63.7 | 2.00 | 1.8 | -0.35 | 3.24 | .1225 | -.630 |
| 5 | 56.5 | 1.70 | -5.4 | -0.65 | 29.16 | .4225 | 3.510 |
| 6 | 61.8 | 2.20 | -0.1 | -0.15 | .01 | .0225 | .015 |
| 7 | 59.0 | 2.20 | -2.9 | -0.15 | 8.41 | .0225 | .435 |
| 8 | 66.3 | .60 | 4.4 | -1.75 | 19.36 | 3.0625 | -7.700 |
| 9 | 64.5 | 2.30 | 2.6 | -0.05 | 6.76 | .0025 | - .130 |
| 10 | 74.8 | 3.50 | 12.9 | 1.15 | 166.41 | 1.3225 | 14.835 |
| 11 | 62.5 | 2.41 | 0.6 | 0.06 | .36 | .0036 | .036 |
| 12 | 70.0 | 2.70 | 8.1 | 0.35 | 65.61 | .1225 | 2.835 |
| 13 | 65.3 | 1.64 | 3.4 | -0.71 | 11.56 | .5041 | -2.414 |
| 14 | 81.3 | 3.23 | 19.4 | 0.88 | 376.36 | .7744 | 17.072 |
| 15 | 66.8 | 1.86 | 4.9 | -0.49 | 24.01 | .2401 | -2.401 |
| 16 | 53.8 | 3.63 | -8.9 | 1.28 | 79.21 | 1.6384 | -11.392 |
| 17 | 67.3 | 2.50 | 5.4 | 0.15 | 29.16 | .0225 | .810 |
| 18 | 53.7 | 2.40 | -8.2 | 0.05 | 67.24 | .0025 | -.410 |
| 19 | 71.3 | 3.60 | 9.4 | 1.25 | 88.36 | 1.5625 | 11.750 |
| 20 | 51.3 | 2.30 | -10.6 | -0.05 | 112.36 | .0025 | .530 |
| 21 | 78.7 | 2.46 | 16.8 | 0.11 | 282.24 | .0121 | 1.848 |
| 22 | 56.3 | 1.80 | -5.6 | -0.55 | 31.36 | .3025 | 3.080 |
| 23 | 52.5 | 2.00 | -9.4 | -0.35 | 88.36 | .1225 | 3.290 |
| 24 | 54.3 | 1.75 | -7.6 | -0.60 | 57.76 | .3600 | 4.560 |
| 25 | 53.0 | 2.50 | -8.9 | 0.15 | 79.21 | .0225 | -1.335 |
| 26 | 60.0 | 1.80 | -1.9 | -0.55 | 3.61 | .3025 | 1.045 |
| 27 | 56.3 | 2.35 | -5.6 | 0 | 31.36 | 0 | 0 |
| 28 | 55.8 | 2.40 | -6.1 | 0.05 | 37.21 | .0025 | -.305 |
| 29 | 60.6 | 2.30 | -1.3 | -0.05 | 1.69 | .0025 | .065 |
| 30 | 75.7 | 3.50 | 13.8 | 1.15 | 190.44 | 1.3225 | 15.870 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 31 | 55.8 | 2.20 | -6.1 | -0.15 | 37.21 | .0225 | .915 |
| 32 | 59.7 | 2.30 | -2.2 | -0.05 | 4.84 | .0025 | .110 |
| 33 | 62.0 | 2.40 | 0.1 | 0.05 | .01 | .0025 | .005 |
| 34 | 76.3 | 3.80 | 14.4 | 1.45 | 207.36 | 2.1025 | 20.880 |
| 35 | 62.3 | 3.00 | 0.4 | 0.65 | .16 | .4225 | .260 |
| 36 | 53.5 | 3.00 | -8.4 | 0.65 | 70.56 | .4225 | -5.460 |
| 37 | 68.7 | .80 | 6.8 | -1.55 | 46.24 | 2.4025 | -10.540 |
| 38 | 58.5 | 2.80 | -3.4 | 0.45 | 11.56 | .2025 | -1.530 |
| 39 | 60.7 | 2.25 | -1.2 | -0.10 | 1.44 | .0100 | .120 |
| 40 | 58.5 | 3.00 | -3.4 | 0.65 | 11.56 | .4225 | -2.210 |
| | 2476.5 | 94.13 | | | 2390.43 | 20.1777 | 69.459 |

Mean: $\frac{\Sigma \text{Scores:}}{N}$ Departmental Examinations: $\frac{2476.5}{40} = 61.9$

University: $\frac{94.13}{40} = 2.35$

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ Departmental Examinations

$\frac{2390.43}{40} = 7.73$

University: $\frac{20.1777}{40} = .710$

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SD_x)(SD_y)}$ : $r = \frac{69.459}{40\ (7.73)(.710)} = .316$

TABLE II

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF ENGLISH MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 55 | 1.15 | -6.4 | -1.00 | 40.96 | 1.0000 | 6.400 |
| 2 | 68 | 2.00 | 6.6 | -0.15 | 43.56 | .0225 | -.990 |
| 3 | 53 | 1.80 | -8.4 | -0.35 | 70.56 | .1225 | 2.940 |
| 4 | 68 | 2.00 | 6.6 | -0.15 | 43.56 | .0225 | -.990 |
| 5 | 44 | 1.70 | -17.4 | -0.45 | 302.76 | .2025 | 7.830 |
| 6 | 55 | 2.00 | -6.4 | -0.15 | 40.96 | .0225 | .960 |
| 7 | 65 | 2.00 | 3.6 | -0.15 | 12.96 | .0225 | -.540 |
| 8 | 65 | .60 | 3.6 | -1.55 | 12.96 | 2.4025 | -5.580 |
| 9 | 72 | 2.30 | 10.6 | 0.15 | 112.36 | .0225 | 1.590 |
| 10 | 69 | 3.50 | 7.6 | 1.35 | 57.76 | 1.8225 | 10.260 |
| 11 | 56 | 2.41 | -5.4 | 0.26 | 29.16 | .0676 | -1.404 |
| 12 | 67 | 2.70 | 5.6 | 0.55 | 31.36 | .3025 | 3.080 |
| 13 | 53 | 1.64 | -8.4 | -0.51 | 70.56 | .2601 | 4.284 |
| 14 | 54 | 1.86 | -7.4 | -0.29 | 54.76 | .0841 | 2.146 |
| 15 | 56 | 3.63 | -5.4 | 1.48 | 29.16 | 2.1904 | -7.992 |
| 16 | 58 | 2.50 | -3.4 | 0.35 | 11.56 | .1225 | -1.190 |
| 17 | 58 | 2.40 | -3.4 | 0.25 | 11.56 | .0625 | - .850 |
| 18 | 73 | 2.46 | 11.6 | 0.31 | 134.56 | .0961 | 3.596 |
| 19 | 58 | 1.80 | -3.4 | -0.35 | 11.56 | .1225 | 1.190 |
| 20 | 69 | 2.00 | 7.6 | -0.15 | 57.76 | .0225 | -1.140 |
| 21 | 62 | 1.75 | 0.6 | -0.40 | .36 | .1600 | - .240 |
| 22 | 63 | 2.50 | 1.6 | 0.35 | 2.56 | .1225 | .560 |
| 23 | 54 | 1.80 | -7.4 | -0.35 | 54.76 | .1225 | 2.590 |
| 24 | 65 | 2.35 | 3.6 | 0.20 | 12.96 | .0400 | .720 |
| 25 | 61 | 2.40 | -0.4 | 0.25 | .16 | .0625 | -.100 |
| 26 | 59 | 2.30 | -2.4 | 0.15 | 5.76 | .0225 | -.360 |
| 27 | 70 | 3.50 | 8.6 | 1.35 | 73.96 | 1.8225 | 11.610 |
| 28 | 56 | 2.20 | -5.4 | 0.05 | 29.16 | .0025 | -.270 |
| 29 | 66 | 2.30 | 4.6 | 0.15 | 21.16 | .0225 | .690 |
| 30 | 68 | 2.40 | 6.6 | 0.25 | 43.56 | .0625 | 1.650 |
| 31 | 62 | .80 | 0.6 | -1.35 | .36 | 1.8225 | -.810 |
| | 1902 | 66.75 | | | 1425.16 | 13.2558 | 39.640 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ Departmental Examinations: $\frac{1902}{31} = 61.4$

University: $\frac{66.75}{31} = 2.15$

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ Departmental Examinations $\frac{1425.16}{31} = 6.78$

University $\frac{13.2558}{31} = .654$

Correlation Coefficient (r): $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx) (SDy)}}$ $r = \frac{39.640}{31 \text{ (6.78)(.654)}} = .288$

TABLE III

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF MATHEMATICS MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 50 | 1.15 | -20.5 | -1.14 | 420.25 | 1.2996 | 23.370 |
| 2 | 88 | 2.00 | 17.5 | -0.29 | 306.25 | .0841 | -5.075 |
| 3 | 68 | 1.70 | -2.5 | -0.59 | 6.25 | .3481 | 1.475 |
| 4 | 65 | 2.20 | -5.5 | -0.09 | 30.25 | .0081 | .495 |
| 5 | 71 | 0.60 | .5 | -1.69 | .25 | 2.8561 | -.845 |
| 6 | 87 | 3.50 | 16.5 | 1.21 | 272.25 | 1.4641 | 19.965 |
| 7 | 66 | 2.41 | -4.5 | 0.12 | 20.25 | .0144 | -.540 |
| 8 | 66 | 1.64 | -4.5 | -0.65 | 20.25 | .4225 | 2.925 |
| 9 | 82 | 3.23 | 7.5 | 0.94 | 56.25 | .8836 | 7.050 |
| 10 | 81 | 1.86 | 6.5 | -0.43 | 42.25 | .1849 | -2.795 |
| 11 | 74 | 2.50 | 3.5 | 0.21 | 12.25 | .0441 | .735 |
| 12 | 77 | 3.60 | 6.5 | 1.31 | 42.25 | 1.7161 | 8.515 |
| 13 | 50 | 2.30 | -20.5 | 0.01 | 420.25 | .0001 | -.205 |
| 14 | 88 | 2.46 | 17.5 | 0.17 | 306.25 | .0289 | 2.975 |
| 15 | 60 | 1.75 | -10.5 | -0.54 | 110.25 | .2916 | 5.670 |
| 16 | 70 | 1.80 | - .5 | -0.49 | .25 | .2401 | .245 |
| 17 | 53 | 2.40 | -17.5 | 0.11 | 306.25 | .0121 | -1.925 |
| 18 | 75 | 2.30 | 4.5 | 0.01 | 20.25 | .0001 | .045 |
| 19 | 82 | 3.50 | 11.5 | 1.21 | 132.25 | 1.4641 | 13.915 |
| 20 | 64 | 2.40 | -6.5 | 0.11 | 42.25 | .0121 | -.715 |
| 21 | 63 | 3.00 | -7.5 | 0.71 | 56.25 | .5041 | -5.325 |
| 22 | 61 | 3.00 | -9.5 | 0.71 | 90.25 | .5041 | -6.745 |
| 23 | 87 | 0.80 | 16.5 | -1.49 | 272.25 | 2.2201 | -24.585 |
| 24 | 64 | 2.80 | -6.5 | 0.51 | 42.25 | .2601 | -3.315 |
| | 1692 | 54.90 | | | 3028.00 | 14.8632 | 35.310 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$: Departmental Examinations: 1692/24 = 70.5

University: 54.90/24= 2.29

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $3828/24 = 11.23$

University: $14.8632/24 = .787$

Correlation Coefficient (r) $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)}$

$r = 35.310/24\ (11.23)\ (.787) = .166$

TABLE IV

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF CHEMISTRY MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 59 | 1.15 | -3.7 | -1.14 | 13.69 | 1.2996 | 4.218 |
| 2 | 60 | 2.00 | -2.7 | -0.29 | 7.29 | .0841 | .783 |
| 3 | 69 | 1.70 | 6.3 | -0.59 | 36.69 | .3481 | -3.717 |
| 4 | 62 | 2.20 | -0.7 | -0.09 | .49 | .0081 | .063 |
| 5 | 68 | 0.60 | 5.3 | -1.69 | 28.09 | 2.8561 | -8.957 |
| 6 | 71 | 3.50 | 8.3 | 1.21 | 68.89 | 1.4641 | 10.043 |
| 7 | 60 | 2.41 | -2.7 | 0.12 | 7.29 | .0144 | -.324 |
| 8 | 85 | 2.70 | 22.3 | 0.41 | 497.29 | .1681 | 9.143 |
| 9 | 62 | 1.64 | -0.7 | -0.65 | .49 | .4225 | .455 |
| 10 | 89 | 3.23 | 26.3 | 0.94 | 691.69 | .8836 | 24.722 |
| 11 | 66 | 1.86 | 3.3 | -0.43 | 10.89 | .1849 | -1.419 |
| 12 | 70 | 2.50 | 7.3 | 0.21 | 53.29 | .0441 | 1.533 |
| 13 | 70 | 3.60 | 7.3 | 1.31 | 53.29 | 1.7161 | 9.563 |
| 14 | 50 | 2.30 | -12.7 | 0.01 | 161.29 | .0001 | -.127 |
| 15 | 41 | 1.75 | -21.7 | -0.54 | 470.89 | .2916 | 11.718 |
| 16 | 61 | 1.80 | - 1.7 | -0.49 | 2.89 | .2401 | .833 |
| 17 | 50 | 2.35 | -12.7 | 0.06 | 161.29 | .0036 | -.762 |
| 18 | 59 | 2.40 | - 3.7 | 0.11 | 13.69 | .0121 | -.407 |
| 19 | 46 | 2.30 | -16.7 | 0.01 | 278.89 | .0001 | -.167 |
| 20 | 59 | 2.30 | - 3.7 | 0.01 | 13.69 | .0001 | -.037 |
| 21 | 73 | 3.00 | 10.3 | 0.71 | 106.09 | .5041 | 7.313 |
| 22 | 50 | 3.00 | -12.7 | 0.71 | 161.29 | .5041 | -9.017 |
| | 1380 | 50.29 | | | 2842.38 | 11.0497 | 55.453 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ Departmental Examinations: 1380/22 = 62.7

University: 50.29/22 = 2.29

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $2842.38/22 = 11.36$

University: $11.0497/22 = .709$

Correlation Coefficient (r):

$$\frac{\sum dx\ dy}{N\ (SDx)(SDy)} \quad r = 55.453/22\ (11.36)\ (7.09) = .313$$

TABLE V

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF FRENCH MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 55 | 2.00 | -3.2 | -0.52 | 10.24 | .2704 | 1.664 |
| 2 | 57 | 2.00 | -1.2 | -0.52 | 1.44 | .2704 | .224 |
| 3 | 72 | 1.70 | 13.8 | -0.82 | 190.44 | .6724 | -11.316 |
| 4 | 83 | 3.23 | 24.8 | 0.71 | 615.04 | .5041 | 17.608 |
| 5 | 61 | 3.63 | 2.8 | 1.11 | 7.84 | 1.2321 | 3.108 |
| 6 | 67 | 2.50 | 8.8 | -0.02 | 77.44 | .0004 | -.176 |
| 7 | 54 | 2.30 | -4.2 | -0.22 | 17.64 | .0484 | .924 |
| 8 | 41 | 1.80 | -17.2 | -0.72 | 295.84 | .5184 | 12.384 |
| 9 | 57 | 2.50 | -1.2 | -0.02 | 1.44 | .0004 | .024 |
| 10 | 51 | 2.35 | -7.2 | -0.17 | 51.84 | .0289 | 1.224 |
| 11 | 50 | 2.40 | -8.2 | -0.12 | 67.24 | .0144 | .984 |
| 12 | 51 | 2.30 | -7.2 | -0.22 | 51.84 | .0484 | 1.584 |
| 13 | 53 | 2.20 | -5.2 | -0.32 | 27.04 | .1024 | 1.664 |
| 14 | 54 | 2.30 | -4.2 | -0.22 | 17.64 | .0484 | .924 |
| 15 | 88 | 3.80 | 29.8 | 1.28 | 888.04 | 1.6384 | 38.144 |
| 16 | 51 | 3.00 | -7.2 | 0.48 | 51.84 | .2304 | -3.456 |
| 17 | 53 | 2.80 | -5.2 | 0.28 | 27.04 | .0784 | -1.456 |
| 18 | 56 | 2.25 | -2.2 | -0.27 | 4.84 | .0729 | .594 |
| 19 | 51 | 3.00 | -7.2 | 0.48 | 51.84 | .2304 | -3.456 |
| | 1105 | 48.06 | | | 2456.56 | 6.0100 | 61.594 |

Mean: $\frac{\Sigma \text{Scores}}{N}$ Departmental Examinations: 1105/19 = 58.2

University: 48.06/19 = 2.52

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: 2456.56/19 = 11.37

University: 6.0100/19 = .563

Correlation Coefficient (r): $\frac{\Sigma \, dx \; dy}{N \; (SDx)(SDy)}$

$$r = 61.594/19 \; (11.37) \; (.563) = .506$$

TABLE VI

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF AVERAGE MARKS CERTIFIED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 60.2 | 1.15 | -4.1 | -1.20 | 16.81 | 1.4400 | 4.920 |
| 2 | 58.6 | 2.00 | -5.7 | -0.35 | 32.49 | .1225 | 1.995 |
| 3 | 57.2 | 1.80 | -7.1 | -0.55 | 50.41 | .3025 | 3.905 |
| 4 | 69.0 | 2.00 | 4.7 | -0.35 | 22.09 | .1225 | -1.645 |
| 5 | 63.2 | 1.70 | -1.1 | -0.65 | 1.21 | .4225 | .715 |
| 6 | 63.0 | 2.20 | -1.3 | -0.15 | 1.69 | .0225 | .195 |
| 7 | 66.3 | 2.20 | 2.0 | -0.15 | 4.00 | .0225 | -.300 |
| 8 | 65.0 | 0.60 | 1.3 | -1.75 | 1.69 | 3.0625 | -2.275 |
| 9 | 67.7 | 2.30 | 3.4 | -0.05 | 11.56 | .0025 | -.170 |
| 10 | 69.8 | 3.50 | 5.5 | 1.15 | 30.25 | 1.3225 | 6.325 |
| 11 | 64.6 | 2.41 | 0.3 | 0.06 | .09 | .0036 | .018 |
| 12 | 72.4 | 2.70 | 8.1 | 0.35 | 65.61 | .1225 | 2.835 |
| 13 | 62.0 | 1.64 | -1.3 | -0.71 | 1.69 | .5041 | .923 |
| 14 | 82.4 | 3.23 | 18.1 | 0.88 | 327.61 | .7744 | 15.928 |
| 15 | 56.4 | 1.86 | -7.9 | -0.49 | 62.41 | .2401 | 3.871 |
| 16 | 67.5 | 3.63 | 3.2 | 1.28 | 10.24 | 1.6384 | 4.096 |
| 17 | 71.2 | 2.50 | 6.9 | 0.15 | 47.61 | .0225 | 1.035 |
| 18 | 55.6 | 2.40 | -8.7 | 0.05 | 75.69 | .0025 | -.435 |
| 19 | 71.0 | 3.60 | 6.7 | 1.25 | 44.89 | 1.5625 | 8.375 |
| 20 | 56.8 | 2.30 | -7.5 | -0.05 | 56.25 | .0025 | .375 |
| 21 | 78.4 | 2.46 | 14.1 | 0.11 | 198.81 | .0121 | 1.551 |
| 22 | 62.8 | 1.80 | -1.5 | -0.55 | 2.25 | .3025 | .825 |
| 23 | 55.0 | 2.00 | -9.3 | -0.35 | 86.49 | .1225 | 3.255 |
| 24 | 56.8 | 1.75 | -7.5 | -0.60 | 56.25 | .3600 | 4.500 |
| 25 | 64.3 | 2.50 | 0 | 0.15 | 0 | .0225 | 0 |
| 26 | 54.8 | 1.80 | -9.5 | -0.55 | 90.25 | .3025 | 5.225 |
| 27 | 65.0 | 2.35 | 1.7 | 0 | 2.89 | 0 | 0 |
| 28 | 61.0 | 2.40 | -3.3 | 0.05 | 10.89 | .0025 | .165 |
| 29 | 59.0 | 2.30 | -5.3 | -0.05 | 28.09 | .0025 | -.265 |
| 30 | 64.4 | 3.50 | 1.1 | 1.15 | 1.21 | 1.3225 | 1.265 |
| 31 | 62.6 | 2.20 | -1.7 | -0.15 | 2.89 | .0225 | .255 |
| 32 | 66.2 | 2.30 | 1.9 | -0.05 | 3.61 | .0025 | -.095 |
| 33 | 45.0 | 2.40 | -19.3 | 0.05 | 372.49 | .0025 | -.965 |
| 34 | 76.4 | 3.80 | 12.1 | 1.45 | 146.41 | 2.1025 | 17.545 |
| 35 | 68.8 | 3.00 | 4.5 | 0.65 | 20.25 | .4225 | 2.925 |

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 36 | 61.6 | 3.00 | -2.7 | 0.65 | 7.29 | .4225 | -1.755 |
| 37 | 62.0 | 0.80 | -2.3 | -1.55 | 5.29 | 2.4025 | 3.565 |
| 38 | 66.0 | 2.80 | 1.7 | 0.45 | 2.89 | .2025 | .765 |
| 39 | 70.0 | 2.25 | 5.7 | -0.10 | 32.49 | .0100 | -.570 |
| 40 | 72.3 | 3.00 | 8.0 | 0.65 | 64.00 | .4225 | 5.200 |
| | 2572.3 | 94.13 | | | 1999.03 | 20.1777 | 94.077 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$

High School: 2572.3/40 = 64.3

University: 94.13/40 = 2.35

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

High School: 1999.03/40 = 7.07

University: 20.1777/40 = .710

Correlation Coefficient (r): $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx) (SDy)}}$

r = 94.077/40 (7.07) (.710) = .469

TABLE VII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF ENGLISH MARKS AS CERTIFIED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 65 | 1.15 | 5.6 | -1.17 | 31.36 | 1.3689 | -6.552 |
| 2 | 38 | 2.00 | -21.4 | -0.32 | 457.96 | .1024 | 6.848 |
| 3 | 60 | 1.80 | 0.6 | -0.52 | .36 | .2704 | -.312 |
| 4 | 67 | 2.00 | 7.6 | -0.32 | 57.76 | .1024 | -2.432 |
| 5 | 50 | 1.70 | -9.4 | -0.62 | 88.36 | .3844 | 5.828 |
| 6 | 58 | 2.20 | -1.4 | -0.12 | 1.96 | .0144 | .168 |
| 7 | 72 | 2.20 | 12.6 | -0.12 | 158.76 | .0144 | -1.512 |
| 8 | 60 | .60 | 0.6 | -1.72 | .36 | 2.9584 | -1.032 |
| 9 | 63 | 2.30 | 3.6 | -0.02 | 12.96 | .0004 | -.072 |
| 10 | 57 | 3.50 | -2.4 | 1.18 | 5.76 | 1.3924 | -2.832 |
| 11 | 54 | 2.41 | -5.4 | 0.09 | 29.16 | .0081 | -.486 |
| 12 | 67 | 2.70 | 7.6 | 0.38 | 57.76 | .1444 | 2.888 |
| 13 | 52 | 1.64 | -7.4 | -0.68 | 54.76 | .4624 | 5.032 |
| 14 | 67 | 3.23 | 7.6 | 0.91 | 57.76 | .8281 | 6.916 |
| 15 | 50 | 1.86 | -9.4 | -0.46 | 88.36 | .2116 | 4.324 |
| 16 | 42 | 3.63 | -17.4 | 1.31 | 302.76 | 1.7161 | -22.794 |
| 17 | 50 | 2.50 | -9.4 | 0.18 | 88.36 | .0324 | -1.692 |
| 18 | 50 | 2.40 | -9.4 | 0.08 | 88.36 | .0064 | - .752 |
| 19 | 73 | 3.60 | 13.6 | 1.28 | 184.96 | 1.6384 | 17.408 |
| 20 | 78 | 2.30 | 18.6 | -0.02 | 345.96 | .0004 | - .372 |
| 21 | 79 | 2.46 | 19.6 | 0.14 | 384.16 | .0196 | 2.744 |
| 22 | 54 | 1.80 | -5.4 | -0.52 | 29.16 | .2704 | 2.808 |
| 23 | 60 | 2.00 | 0.6 | -0.32 | .36 | .1024 | -.192 |
| 24 | 50 | 1.75 | -9.4 | -0.57 | 88.36 | .3249 | 5.358 |
| 25 | 73 | 2.50 | 13.6 | 0.18 | 184.96 | .0324 | 2.448 |
| 26 | 55 | 1.80 | -4.4 | -0.52 | 19.36 | .2704 | 2.288 |
| 27 | 67 | 2.35 | 7.6 | 0.03 | 57.76 | .0009 | .228 |
| 28 | 63 | 2.40 | 3.6 | 0.08 | 12.96 | .0064 | .288 |
| 29 | 44 | 2.30 | -15.4 | -0.02 | 237.16 | .0004 | .308 |
| 30 | 42 | 3.50 | -17.4 | 1.18 | 302.76 | 1.3924 | -20.532 |
| 31 | 62 | 2.20 | 2.6 | -0.12 | 6.76 | .0144 | -.312 |
| 32 | 52 | 2.30 | -7.4 | -0.02 | 54.76 | .0004 | .148 |
| 33 | 41 | 2.40 | -18.4 | 0.08 | 338.56 | .0064 | -1.472 |
| 34 | 70 | 3.80 | 10.6 | 1.48 | 112.36 | 2.1904 | 15.688 |

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 35 | 70 | 3.00 | 10.6 | .68 | 112.36 | .4624 | 7.208 |
| 36 | 70 | 3.00 | 10.6 | .68 | 112.36 | .4624 | 7.208 |
| 37 | 62 | 0.80 | 2.6 | -1.52 | 6.76 | 2.3104 | -3.952 |
| 38 | 70 | 2.25 | 10.6 | -0.07 | 112.36 | .0049 | - .742 |
| | 2257 | 88.33 | | | 4287.08 | 19.5287 | 28.092 |

Mean: $\frac{\Sigma \text{Scores}}{N}$ High School: 2257/38 = 59.4

University: 88.33/38 = 2.32

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

High School: 4287.08/38 = 10.62

University : 19.5287/38 = .717

Correlation Coefficient (r): $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx)(Sdy)}}$

r = 28.092/38 (10.62) (.717) = .097

TABLE VIII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF MATHEMATICS MARKS AS CERTIFIED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 60 | 1.15 | -4.5 | -1.21 | 20.25 | 1.4641 | 5.445 |
| 2 | 77 | 2.00 | 12.5 | -0.36 | 156.25 | .1296 | -4.500 |
| 3 | 53 | 1.80 | -11.5 | -0.56 | 132.25 | .3136 | 6.440 |
| 4 | 74 | 2.00 | 9.5 | -0.36 | 90.25 | .1296 | -3.420 |
| 5 | 63 | 1.70 | -1.5 | -0.66 | 2.25 | .4356 | .990 |
| 6 | 55 | 2.20 | -9.5 | -0.16 | 90.25 | .0256 | 1.520 |
| 7 | 59 | 2.20 | -5.5 | -0.16 | 30.25 | .0256 | .880 |
| 8 | 69 | 0.60 | 4.5 | -1.76 | 20.25 | 3.0976 | -7.920 |
| 9 | 62 | 2.30 | -2.5 | -0.06 | 6.25 | .0036 | .150 |
| 10 | 78 | 3.50 | 13.5 | 1.14 | 182.25 | 1.2996 | 15.390 |
| 11 | 64 | 2.41 | -0.5 | 0.05 | .25 | .0025 | -.025 |
| 12 | 72 | 2.70 | 7.5 | 0.34 | 56.25 | .1156 | 2.550 |
| 13 | 61 | 1.64 | -3.5 | -0.72 | 12.25 | .5184 | 2.520 |
| 14 | 82 | 3.23 | 17.5 | 0.87 | 306.25 | .7569 | 15.225 |
| 15 | 52 | 1.86 | -12.5 | -0.50 | 156.25 | .2500 | 6.250 |
| 16 | 84 | 3.63 | 19.5 | 1.27 | 380.25 | 1.6129 | 24.765 |
| 17 | 77 | 2.50 | 12.5 | 0.14 | 156.25 | .0196 | 1.750 |
| 18 | 50 | 2.40 | -14.5 | 0.04 | 210.25 | .0016 | -.580 |
| 19 | 71 | 3.60 | 6.5 | 1.24 | 42.25 | 1.5376 | 8.060 |
| 20 | 51 | 2.30 | -13.5 | -0.06 | 182.25 | .0036 | .810 |
| 21 | 82 | 2.46 | 17.5 | 0.10 | 306.25 | .0100 | 1.750 |
| 22 | 50 | 2.00 | -14.5 | -0.36 | 210.25 | .1296 | 5.220 |
| 23 | 54 | 1.75 | -10.5 | -0.61 | 110.25 | .3721 | 6.405 |
| 24 | 63 | 1.80 | - 1.5 | -0.56 | 2.25 | .3136 | .840 |
| 25 | 70 | 2.35 | 5.5 | -0.01 | 30.25 | .0001 | -.055 |
| 26 | 58 | 2.40 | - 6.5 | 0.04 | 42.25 | .0016 | -.260 |
| 27 | 71 | 2.30 | 6.5 | -0.06 | 42.25 | .0036 | -.390 |
| 28 | 65 | 3.50 | 0.5 | 1.14 | .25 | 1.2996 | .570 |
| 29 | 40 | 2.40 | -24.5 | 0.04 | 600.25 | .0016 | -.980 |
| 30 | 70 | 3.80 | 5.5 | 1.44 | 30.25 | 2.0736 | 7.920 |
| 31 | 63 | 3.00 | -1.5 | 0.64 | 2.25 | .4096 | -.960 |
| 32 | 55 | 3.00 | -9.5 | 0.64 | 90.25 | .4096 | -6.080 |
| 33 | 77 | 0.80 | 12.5 | -1.56 | 156.25 | 2.4336 | -19.500 |
| 34 | 62 | 2.80 | -2.5 | 0.44 | 6.25 | .1936 | -1.100 |
| | 2194 | 80.08 | | | 3862.50 | 19.3950 | 69.680 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ High School: 2194/38 = 64.5

University: 80.08/38 = 2.36

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

High School: 3862.50/38 = 10.66

University: 19.3950/38 = .755

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SDx)\ (SDy)}$

$r = 69.680/38\ (10.66)\ (.755) = .255$

TABLE IX

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF CHEMISTRY MARKS AS CERTIFIED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 59 | 1.15 | -5.6 | -1.17 | 31.36 | 1.3689 | 6.552 |
| 2 | 59 | 2.00 | -5.6 | -0.32 | 31.36 | .1024 | 1.792 |
| 3 | 70 | 2.00 | 5.4 | -0.32 | 29.16 | .1024 | -1.728 |
| 4 | 66 | 1.70 | 1.4 | -0.62 | 1.96 | .3844 | -.868 |
| 5 | 66 | 2.20 | 1.4 | -0.12 | 1.96 | .0144 | -.168 |
| 6 | 62 | 0.60 | -2.6 | -1.72 | 6.76 | 2.9584 | 4.472 |
| 7 | 81 | 3.50 | 16.4 | 1.18 | 268.96 | 1.3924 | 19.352 |
| 8 | 62 | 2.41 | -2.6 | 0.09 | 6.76 | .0081 | -.234 |
| 9 | 74 | 2.70 | 9.4 | 0.38 | 88.36 | .1444 | 3.572 |
| 10 | 61 | 1.64 | -3.6 | -0.68 | 12.96 | .4624 | 2.448 |
| 11 | 55 | 1.86 | -9.6 | -0.46 | 92.16 | .2116 | 4.416 |
| 12 | 81 | 2.50 | 16.4 | 0.18 | 268.96 | .0324 | 2.952 |
| 13 | 71 | 3.60 | 6.4 | 1.28 | 40.96 | 1.6384 | 8.192 |
| 14 | 52 | 2.30 | -12.6 | -0.02 | 158.76 | .0004 | .252 |
| 15 | 80 | 2.46 | 15.4 | 0.14 | 237.16 | .0196 | 2.156 |
| 16 | 53 | 1.75 | -11.6 | -0.57 | 134.56 | .3249 | 6.612 |
| 17 | 64 | 1.80 | -0.6 | -0.52 | .36 | .2704 | .312 |
| 18 | 60 | 2.35 | -4.6 | 0.03 | 21.16 | .0009 | -.138 |
| 19 | 55 | 2.40 | -9.6 | 0.08 | 92.16 | .0064 | -.768 |
| 20 | 64 | 2.30 | -0.6 | -0.02 | .36 | .0004 | .012 |
| 21 | 66 | 3.50 | 1.4 | 1.18 | 1.96 | 1.3924 | 1.652 |
| 22 | 67 | 2.30 | 2.4 | -0.02 | 5.76 | .0004 | -.048 |
| 23 | 67 | 3.00 | 2.4 | 0.68 | 5.76 | .4624 | 1.632 |
| 24 | 56 | 3.00 | -8.6 | 0.68 | 73.96 | .4624 | -5.848 |
| 25 | 65 | 0.80 | 0.4 | -1.52 | .16 | 2.3104 | -.608 |
| | 1616 | 55.82 | | | 1613.80 | 14.0716 | 55.968 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ High School: 1616/25 = 64.5

University: 55.82/25 = 2.32

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

High School: 1613.80/25 = 8.03

University : 14.0716/25 = .750

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)}$

r = 55.968/25 (8.03) (.750) = .372

TABLE X

CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS OF FRENCH MARKS AS CERTIFIED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 62 | 2.00 | -3.1 | -0.45 | 9:61 | .2025 | 1:395 |
| 2 | 65 | 2.00 | -0.1 | -0.45 | .01 | .2025 | .045 |
| 3 | 71 | 1.70 | 5.9 | -0.75 | 34.81 | .5625 | -4.425 |
| 4 | 72 | 3.50 | 6.9 | 1.05 | 47.61 | 1.1025 | 7.245 |
| 5 | 83 | 2.70 | 17.9 | 0.25 | 320.41 | .0625 | 4.475 |
| 6 | 95 | 3.23 | 29.9 | 0.78 | 894.01 | .6084 | 23.322 |
| 7 | 71 | 2.50 | 5.9 | 0.05 | 34.81 | .0025 | .295 |
| 8 | 46 | 2.30 | -19.1 | -0.15 | 364.81 | .0225 | 2.865 |
| 9 | 73 | 2.46 | 7.9 | 0.10 | 62.41 | .0100 | .790 |
| 10 | 54 | 1.80 | -11.1 | -0.65 | 123.21 | .4225 | 7.215 |
| 11 | 45 | 2.50 | -20.1 | 0.05 | 404.01 | .0025 | -1.005 |
| 12 | 57 | 2.35 | -8.1 | -0.10 | 65.61 | .0100 | .810 |
| 13 | 60 | 2.40 | -5.1 | -0.05 | 26.01 | .0025 | .255 |
| 14 | 54 | 2.30 | -11.1 | -0.15 | 123.21 | .0225 | 1.665 |
| 15 | 55 | 2.20 | -10.1 | -0.25 | 102.01 | .0625 | 2.525 |
| 16 | 64 | 2.30 | -1.1 | -0.15 | 1.21 | .0225 | .165 |
| 17 | 93 | 3.80 | 27.9 | 1.35 | 778.41 | 1.8225 | 37.665 |
| 18 | 70 | 3.00 | 4.9 | 0.55 | 24.01 | .3025 | 2.695 |
| 19 | 59 | 0.80 | -6.1 | -1.65 | 37.21 | 2.7225 | 10.065 |
| 20 | 59 | 2.80 | -6.1 | 0.35 | 37.21 | .1225 | -2.135 |
| 21 | 66 | 2.25 | 0.9 | -0.20 | .81 | .0400 | -.180 |
| 22 | 58 | 3.00 | -7.1 | 0.55 | 50.41 | .3025 | -3.905 |
| | 1432 | 53.89 | | | 3541.82 | 8.6334 | 91.842 |

Mean: $\frac{\Sigma \text{Scores}}{N}$ High School: 1432/22 = 65.1, University:

53.89/22 = 2.45

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

High School: $3541.82/22 = 12.68$

University : $8.6334/22 = .626$

Correlation Coefficient (r): $\frac{\Sigma\, dx\ dy}{N\ (SDx)(SDy)}$

$r = 91.842/22\ (12.68)\ (.626) = .526$

TABLE XI

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF AVERAGE MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND AVERAGE MARKS AS CERTIFIED BY THE HIGH SCHOOL (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 56.8 | 60.2 | -5.1 | -4.1 | 26.01 | 16.81 | 20.91 |
| 2 | 57.4 | 58.6 | -4.5 | -5.7 | 20.25 | 32.49 | 25.65 |
| 3 | 54.0 | 57.2 | -7.9 | -7.1 | 62.41 | 50.41 | 56.09 |
| 4 | 63.7 | 69.0 | 1.8 | 4.7 | 3.24 | 22.09 | 8.46 |
| 5 | 56.5 | 63.2 | -5.4 | -1.1 | 29.16 | 1.21 | 5.94 |
| 6 | 61.8 | 63.0 | -0.1 | -1.3 | .01 | 1.69 | .13 |
| 7 | 59.0 | 66.3 | -2.9 | 2.0 | 8.41 | 4.00 | -5.80 |
| 8 | 66.3 | 65.0 | 4.4 | 1.3 | 19.36 | 1.69 | 5.72 |
| 9 | 64.3 | 67.7 | 2.6 | 3.4 | 6.76 | 11.56 | 8.84 |
| 10 | 74.8 | 69.8 | 12.9 | 5.5 | 166.41 | 30.25 | 70.95 |
| 11 | 62.5 | 64.6 | 0.6 | 0.3 | .36 | .09 | .18 |
| 12 | 70.0 | 72.4 | 8.1 | 8.1 | 65.61 | 65.61 | 65.61 |
| 13 | 65.3 | 62.0 | 3.4 | -1.3 | 11.56 | 1.69 | -4.42 |
| 14 | 81.3 | 82.4 | 19.4 | 18.1 | 376.36 | 327.61 | 351.14 |
| 15 | 66.8 | 56.4 | 4.9 | -7.9 | 24.01 | 62.41 | -38.71 |
| 16 | 53.8 | 67.5 | -8.9 | 3.2 | 79.21 | 10.24 | -28.48 |
| 17 | 67.3 | 71.2 | 5.4 | 6.9 | 29.16 | 47.61 | 37.26 |
| 18 | 53.7 | 55.6 | -8.2 | -8.7 | 67.24 | 75.69 | 71.34 |
| 19 | 71.3 | 71.0 | 9.4 | 6.7 | 88.36 | 44.89 | 62.98 |
| 20 | 51.3 | 56.8 | -10.6 | -7.5 | 112.36 | 56.25 | 79.50 |
| 21 | 78.7 | 78.4 | 16.8 | 14.1 | 282.24 | 198.81 | 236.88 |
| 22 | 56.3 | 62.8 | -5.6 | -1.5 | 31.36 | 2.25 | 8.40 |
| 23 | 52.5 | 55.0 | -9.4 | -9.3 | 88.36 | 86.49 | 87.42 |
| 24 | 54.3 | 56.8 | -7.6 | -7.5 | 57.76 | 56.25 | 57.00 |
| 25 | 53.0 | 64.3 | -8.9 | 0 | 79.21 | 0 | 0 |
| 26 | 60.0 | 54.8 | -1.9 | -9.5 | 3.61 | 90.25 | 18.05 |
| 27 | 56.3 | 65.0 | -5.6 | 1.7 | 31.36 | 2.89 | -9.52 |
| 28 | 55.8 | 61.0 | -6.1 | -3.3 | 37.21 | 10.89 | 20.13 |
| 29 | 60.6 | 59.0 | -1.3 | -5.3 | 1.69 | 28.09 | 6.89 |
| 30 | 75.7 | 64.4 | 13.8 | 1.1 | 190.44 | 1.21 | 15.18 |
| 31 | 55.8 | 62.6 | -6.1 | -1.7 | 37.21 | 2.89 | 10.37 |
| 32 | 59.7 | 66.2 | -2.2 | 1.9 | 4.84 | 3.61 | -4.18 |
| 33 | 62.0 | 45.0 | 0.1 | -19.3 | .01 | 372.49 | -1.93 |
| 34 | 76.3 | 76.4 | 14.4 | 12.1 | 207.36 | 146.41 | 174.24 |

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 35 | 62.3 | 68.8 | 0.4 | 4.5 | .16 | 20.25 | 1.80 |
| 36 | 53.5 | 61.6 | -8.4 | -2.7 | 70.56 | 7.29 | 22.68 |
| 37 | 68.7 | 62.0 | 6.8 | -2.3 | 46.24 | 5.29 | -15.64 |
| 38 | 58.5 | 66.0 | -3.4 | 1.7 | 11.56 | 2.89 | -5.78 |
| 39 | 60.7 | 70.0 | -1.2 | 5.7 | 1.44 | 32.49 | -6.84 |
| 40 | 58.5 | 72.3 | -3.4 | 8.0 | 11.56 | 64.00 | -27.20 |
| | 2476.5 | 2572.3 | | | 2390.43 | 1999.03 | 1381.24 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ Departmental Examinations: $\frac{2476.5}{40} = 61.9$

High School: $\frac{2572.3}{40} = 64.3$

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $\frac{2390.43}{40} = 7.73$

High School: $\frac{1999.03}{40} = 7.07$

Correlation Coefficient: (r) $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx) (SDy)}}$

$$r = \frac{1381.24}{40 \text{ (7.73)(7.07)}} = .632$$

TABLE XII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS AND CORRELATION COEFFICIENT OF ENGLISH MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING ENGLISH MARKS AS CERTIFIED BY THE HIGH SCHOOL (Y)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 55 | 65 | -6.4 | 8.3 | 40.96 | 68.89 | -53.12 |
| 2 | 68 | 38 | 6.6 | -18.7 | 43.56 | 349.69 | -123.42 |
| 3 | 53 | 60 | -8.4 | 3.3 | 70.56 | 10.89 | -27.72 |
| 4 | 68 | 67 | 6.6 | 10.3 | 43.56 | 106.69 | 67.98 |
| 5 | 44 | 50 | -17.4 | -6.7 | 302.56 | 44.89 | -116.58 |
| 6 | 55 | 58 | -6.4 | 1.3 | 40.96 | 1.69 | -8.32 |
| 7 | 65 | 72 | 3.6 | 15.3 | 12.96 | 234.09 | 55.08 |
| 8 | 65 | 60 | 3.6 | 3.3 | 12.96 | 10.89 | 11.88 |
| 9 | 72 | 73 | 10.6 | 16.3 | 112.36 | 265.69 | 172.78 |
| 10 | 69 | 57 | 7.6 | 0.3 | 57.76 | .09 | 2.28 |
| 11 | 56 | 54 | -5.4 | 2.7 | 29.16 | 7.29 | -14.58 |
| 12 | 67 | 67 | 5.6 | 10.3 | 31.36 | 106.69 | 57.68 |
| 13 | 53 | 52 | -8.4 | -4.7 | 70.56 | 22.09 | 39.48 |
| 14 | 54 | 50 | -7.4 | -6.7 | 54.76 | 44.89 | 49.58 |
| 15 | 56 | 42 | -5.4 | -14.7 | 29.16 | 216.09 | 79.38 |
| 16 | 58 | 50 | -3.4 | -6.7 | 11.56 | 44.89 | 22.78 |
| 17 | 58 | 50 | -3.4 | -6.7 | 11.56 | 44.89 | 22.78 |
| 18 | 73 | 79 | 11.6 | 22.3 | 134.56 | 497.29 | 258.68 |
| 19 | 58 | 54 | -3.4 | -2.7 | 11.56 | 7.29 | 9.18 |
| 20 | 69 | 60 | 7.6 | 3.3 | 57.76 | 10.89 | 25.08 |
| 21 | 62 | 50 | 0.6 | -6.7 | .36 | 44.89 | -4.02 |
| 22 | 63 | 73 | 1.6 | 16.3 | 2.56 | 265.69 | 26.08 |
| 23 | 54 | 55 | -7.4 | -1.7 | 54.76 | 2.89 | 12.58 |
| 24 | 65 | 67 | 3.6 | 10.3 | 12.96 | 106.69 | 37.08 |
| 25 | 61 | 63 | -0.4 | 6.3 | .16 | 39.69 | -2.52 |
| 26 | 59 | 44 | -2.4 | -12.7 | 5.76 | 161.29 | 30.48 |
| 27 | 70 | 42 | 8.6 | -14.7 | 73.76 | 216.09 | -126.42 |
| 28 | 56 | 62 | -5.4 | 5.3 | 29.16 | 28.09 | -28.62 |
| 29 | 66 | 52 | 4.6 | -4.7 | 21.16 | 22.09 | -21.62 |
| 30 | 68 | 41 | 6.6 | -15.7 | 43.56 | 246.49 | -103.62 |
| 31 | 62 | 52 | 0.6 | -4.7 | .36 | 22.09 | -2.82 |
| | 1902 | 1759 | | | 1425.16 | 3251.79 | 347.46 |

Mean: $\frac{\Sigma \text{Scores}}{N}$ Departmental Examinations: $\frac{1902}{31} = 61.4$

High School: $\frac{1759}{31} = 56.7$

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $\frac{1425.16}{31} = 6.78$

High School: $\frac{3251.79}{31} = 10.24$

Correlation Coefficient (r): $\frac{\Sigma\, dx\, dy}{N\ (SDx)(SDy)}$

$$r = \frac{288.06}{31\ (6.78)(10.24)} = .134$$

TABLE XIII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS OF MATHEMATICS MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING MATHEMATICS MARKS AS CERTIFIED BY THE HIGH SCHOOL (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 50 | 60 | -20.5 | 5.0 | 420.25 | 25.0 | -102.5 |
| 2 | 88 | 77 | 17.5 | 12.0 | 306.25 | 144.0 | 210.0 |
| 3 | 68 | 63 | -2.5 | 2.0 | 6.25 | 4.0 | -5.0 |
| 4 | 65 | 55 | -5.5 | -10.0 | 30.25 | 100.0 | 55.0 |
| 5 | 71 | 69 | .5 | 4.0 | .25 | 16.0 | 2.0 |
| 6 | 87 | 78 | 16.5 | 13.0 | 272.25 | 169.0 | 214.5 |
| 7 | 66 | 64 | -4.5 | -1.0 | 20.25 | 1.0 | 4.5 |
| 8 | 66 | 61 | -4.5 | -4.0 | 20.25 | 16.0 | 18.0 |
| 9 | 82 | 82 | 7.5 | 17.0 | 56.25 | 289.0 | 127.5 |
| 10 | 81 | 52 | 6.5 | -13.0 | 42.25 | 169.0 | -84.5 |
| 11 | 74 | 77 | 3.5 | 12.0 | 12.25 | 144.0 | 42.0 |
| 12 | 77 | 71 | 6.5 | 6.0 | 42.25 | 36.0 | 39.0 |
| 13 | 50 | 51 | -20.5 | -14.0 | 420.25 | 196.0 | 287.0 |
| 14 | 88 | 82 | 17.5 | 17.0 | 306.25 | 289.0 | 297.5 |
| 15 | 60 | 54 | -10.5 | -11.0 | 110.25 | 121.0 | 115.5 |
| 16 | 70 | 63 | -0.5 | -2.0 | .25 | 4.0 | 1.0 |
| 17 | 53 | 58 | - 17.5 | -7.0 | 306.25 | 49.0 | 122.5 |
| 18 | 75 | 71 | 4.5 | 6.0 | 20.25 | 36.0 | 27.0 |
| 19 | 82 | 65 | 11.5 | 0 | 132.25 | 0 | 0 |
| 20 | 64 | 40 | -6.5 | -25.0 | 42.25 | 625.0 | 162.5 |
| 21 | 63 | 63 | -7.5 | -2.0 | 56.25 | 4.0 | 15.0 |
| 22 | 61 | 55 | -9.5 | -10.0 | 90.25 | 100.0 | 95.0 |
| 23 | 87 | 77 | 16.5 | 12.0 | 272.25 | 144.0 | 198.0 |
| 24 | 64 | 72 | -6.5 | 7.0 | 42.25 | 49.0 | -45.5 |
| | 1692 | 1560 | | | 3028.00 | 2730.0 | 1796.00 |

Mean: $\Sigma$ Scores/N  Departmental Examinations: 1692/24 = 70.5

High School: 1560/24 = 65.0

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $3028/24 = 11.23$

High School: $2730/24 = 10.66$

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)}$

$$r = 1796/(24)(11.23)(10.66) = .625$$

TABLE XIV

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF CHEMISTRY MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING CHEMISTRY MARKS AS CERTIFIED BY THE HIGH SCHOOL (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 59 | 59 | -3.7 | -5.7 | 13.69 | 32.49 | 21.09 |
| 2 | 60 | 59 | -2.7 | -5.7 | 7.29 | 32.49 | 15.39 |
| 3 | 69 | 66 | 6.3 | 1.3 | 36.69 | 1.69 | 8.19 |
| 4 | 62 | 66 | -0.7 | 1.3 | .49 | 1.69 | -0.91 |
| 5 | 68 | 62 | 5.3 | -2.7 | 28.09 | 7.29 | -14.31 |
| 6 | 71 | 81 | 8.3 | 16.3 | 68.89 | 265.69 | 135.29 |
| 7 | 60 | 62 | -2.7 | -2.7 | 7.29 | 7.29 | 7.29 |
| 8 | 85 | 74 | 22.3 | 9.3 | 497.29 | 86.49 | 207.39 |
| 9 | 62 | 61 | -0.7 | -1.7 | .49 | 2.89 | 1.19 |
| 10 | 89 | 80 | 26.3 | 15.3 | 691.69 | 234.09 | 402.39 |
| 11 | 66 | 55 | 3.3 | -9.7 | 10.89 | 94.09 | -32.01 |
| 12 | 70 | 81 | 7.3 | 16.3 | 53.29 | 265.69 | 118.99 |
| 13 | 70 | 71 | 7.3 | 6.3 | 53.29 | 39.69 | 45.99 |
| 14 | 50 | 52 | -12.7 | -12.7 | 161.29 | 161.29 | 161.29 |
| 15 | 41 | 53 | -21.7 | -11.7 | 470.89 | 136.89 | 253.89 |
| 16 | 61 | 64 | -1.7 | -0.7 | 2.89 | .49 | 1.19 |
| 17 | 50 | 60 | -12.7 | -4.7 | 161.29 | 22.09 | 59.69 |
| 18 | 59 | 55 | -3.7 | -9.7 | 13.69 | 94.09 | 35.89 |
| 19 | 46 | 64 | -16.7 | -0.7 | 278.89 | .49 | 11.69 |
| 20 | 59 | 67 | -3.7 | 2.3 | 13.69 | 5.29 | -8.51 |
| 21 | 73 | 67 | 10.3 | 2.3 | 106.09 | 5.29 | 23.69 |
| 22 | 50 | 65 | -12.7 | 0.3 | 161.29 | .09 | -3.81 |
| | 1380 | 1424 | | | 2842.38 | 1497.58 | 1450.98 |

Mean: $\Sigma$ Scores/N: Departmental Examinations: 1380/22 = 62.7

High School: 1424/22 = 64.7

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: $2842.38/22 = 11.36$

High School: $1497.58/22 = 8.25$

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)}$

$$r = \frac{1450.98}{22\ (11.36)(8.25)} = .704$$

TABLE XV

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT OF FRENCH MARKS OBTAINED ON DEPARTMENTAL EXAMINATIONS (X) AND CORRESPONDING FRENCH MARKS AS CERTIFIED BY THE HIGH SCHOOL (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 55 | 62 | -3.2 | -1.4 | 10.24 | 1.96 | 4.48 |
| 2 | 57 | 65 | -1.2 | 1.6 | 1.44 | 2.56 | 1.92 |
| 3 | 72 | 71 | 13.8 | 7.6 | 190.44 | 57.76 | 104.88 |
| 4 | 83 | 95 | 24.8 | 31.6 | 615.04 | 998.56 | 783.68 |
| 5 | 61 | 59 | 2.8 | -4.4 | 7.84 | 19.36 | 12.32 |
| 6 | 67 | 71 | 8.8 | 7.6 | 77.44 | 57.76 | 66.88 |
| 7 | 54 | 46 | -4.2 | -17.4 | 17.64 | 302.76 | 73.08 |
| 8 | 41 | 54 | -17.2 | -9.4 | 295.84 | 88.36 | 161.68 |
| 9 | 57 | 45 | -1.2 | -18.4 | 1.44 | 338.56 | 22.08 |
| 10 | 51 | 57 | -7.2 | -6.4 | 51.84 | 40.96 | 46.08 |
| 11 | 50 | 60 | -8.2 | -3.4 | 67.24 | 11.56 | 27.88 |
| 12 | 51 | 54 | -7.2 | -9.4 | 51.84 | 88.36 | 67.88 |
| 13 | 53 | 55 | -5.2 | -8.4 | 27.04 | 70.56 | 43.68 |
| 14 | 54 | 64 | -4.2 | 0.6 | 17.64 | .36 | 2.52 |
| 15 | 88 | 93 | 29.8 | 29.6 | 888.04 | 876.16 | 882.08 |
| 16 | 51 | 70 | -7.2 | 6.6 | 51.84 | 43.56 | 47.52 |
| 17 | 53 | 59 | -5.2 | -4.4 | 27.04 | 19.36 | 22.88 |
| 18 | 56 | 66 | -2.2 | 2.6 | 4.84 | 6.76 | 5.72 |
| 19 | 51 | 58 | -7.2 | -5.4 | 51.84 | 29.16 | 38.88 |
| | 1105 | 1204 | | | 2456.56 | 3054.44 | 2416.12 |

Mean: $\Sigma$ Scores/N  Departmental Examinations: 1105/19 = 58.2

High School: 1204/19 = 63.4

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$

Departmental Examinations: 2456.56/19 = 11.37

High School: 3054.44/19 = 12.68

Correlation Coefficient (r): $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)} = \frac{2416.12}{19\ (11.37)(12.68)} = .882$

TABLE XVI

SUMMARY OF CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS FOR MARKS SCORED ON DEPARTMENTAL EXAMINATIONS AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (GPA)

| | MEAN | | STANDARD DEVIATION | | CORRELATION COEFFICIENT ($r_{23}$) |
|---|---|---|---|---|---|
| | Departmental Examinations | University GPA | Departmental Examinations | University GPA | |
| Average Marks | 61.9 | 2.35 | 7.73 | .710 | .316 |
| English Marks | 61.4 | 2.15 | 6.78 | .654 | .288 |
| Mathematics Marks | 70.5 | 2.29 | 11.23 | .787 | .166 |
| Chemistry Marks | 62.7 | 2.29 | 11.36 | .709 | .313 |
| French Marks | 58.2 | 2.52 | 11.37 | .563 | .506 |

TABLE XVII

SUMMARY OF CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS FOR MARKS CERTIFIED BY THE HIGH SCHOOL AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (GPA)

| MEAN | | STANDARD DEVIATION | | CORRELATION COEFFICIENT ($r_{13}$) |
|---|---|---|---|---|
| High School | University GPA | Departmental Examinations | University GPA | |
| Average Marks 64.3 | 2.35 | 7.07 | .710 | .469 |
| English Marks 59.4 | 2.32 | 10.62 | .717 | .097 |
| Mathematics Marks 64.5 | 2.36 | 10.66 | .755 | .255 |
| Chemistry Marks 64.6 | 2.32 | 8.03 | .750 | .372 |
| French Marks 65.1 | 2.45 | 12.68 | .626 | .526 |

TABLE XVIII

SUMMARY OF CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS FOR MARKS SCORED ON DEPARTMENTAL EXAMINATIONS AND CORRESPONDING MARKS CERTIFIED BY THE HIGH SCHOOL

| MEAN | | STANDARD DEVIATION | | CORRELATION COEFFICIENT ($r_{12}$) |
|---|---|---|---|---|
| Departmental Examinations | High School | Departmental Examinations | High School | |
| Average Marks 61.9 | 64.3 | 7.73 | 7.07 | .632 |
| English Marks 61.4 | 56.7 | 6.78 | 10.24 | .134 |
| Mathematics Marks 70.5 | 65.0 | 11.23 | 10.66 | .625 |
| Chemistry Marks 62.7 | 64.7 | 11.36 | 8.25 | .704 |
| French Marks 58.2 | 63.4 | 11.37 | 12.68 | .882 |

TABLE XIX

A SUMMARY OF THE FINDINGS FOR THE T TEST OF SIGNIFICANCE OF THE DIFFERENCE BETWEEN TWO CORRELATION COEFFICIENTS RESULTING FROM A COMPARISON OF ACHIEVEMENT ON DEPARTMENTAL EXAMINATIONS IN GRADE XII (DEPT. EXAM.) WITH THE UNIVERSITY GRADE POINT AVERAGE (GPA) AND A COMPARISON OF ACHIEVEMENT IN GRADE XII AS MEASURED BY SCHOOL MARKS WITH THE UNIVERSITY GRADE POINT AVERAGE (GPA)

| | CORRELATION COEFFICIENT | 5% LEVEL | t | SIGNIFICANCE |
|---|---|---|---|---|
| Dept. Exam. Average and University GPA | .316 | | | |
| High School Average and University GPA | .469 | 2.027 | 1.228 | Not Significant |
| Dept. Exam Average and High School Average | .632 | | | |
| Dept. Exam. English Marks and University GPA | .288 | | | |
| High School English Marks and University GPA | .097 | 2.048 | .804 | Not Significant |
| Dept. Exam. English Marks and High School English Marks | .134 | | | |
| Dept. Exam. Mathematics Marks and University GPA | .166 | | | |
| High School Mathematics Marks and University GPA | .255 | 2.080 | .487 | Not Significant |
| Dept. Exam. Mathematics Marks and High School Mathematics marks | .625 | | | |

| | CORRELATION COEFFICIENT | 5% LEVEL | t | SIGNIFICANCE |
|---|---|---|---|---|
| Dept. Exam. Chemistry Marks and University GPA | .313 | | | |
| High School Chemistry Marks and University GPA | .372 | 2.093 | .361 | Not Significant |
| Dept. Exam. Chemistry Marks and High School Chemistry Marks | .704 | | | |
| Dept. Exam. French Marks and University GPA | .506 | | | |
| High School French Marks and University GPA | .526 | 2.120 | .195 | Not Significant |
| Dept. Exam. French Marks and High School French Marks | .882 | | | |

SUMMARY

The survey consisted of all the students from one suburban Winnipeg school division who presented standing to satisfy the entrance requirements for admission to the University of Manitoba during the 1970 - 71 academic year. Each of these students had obtained two sets of final marks in Grade XII, the marks they had scored on a minimum of three departmental examinations and the marks in each Grade XII subject as measured by the student's high school. It was the purpose of this chapter to determine whether a significant difference existed between the correlation coefficient which resulted from a comparison of student achievement on departmental examinations in Grade XII with the first year university grade point average and the correlation coefficient which resulted from a comparison of student achievement in Grade XII as measured by the high school with the first year university grade point average.

The means, standard deviations, and correlations coefficients were calculated and the t test for the significance of the difference between two correlation coefficients was performed. The results of the t test for the significance of the difference between two correlation coefficients showed that there was no significant difference between the correlation coefficient which resulted from a comparison of student achievement on departmental examinations, when applied to average marks and individual subject marks, with

the first year university grade point average; and the correlation coefficient which resulted from a comparison of student achievement in Grade XII as measured by marks certified by the high school, when applied to average marks and individual subject marks, with the first year university grade point average.

# CHAPTER V

## THE DATA AND ITS INTERPRETATION (GRADE XII CLASS OF 1971)

### Introduction

The data in this chapter is based on all the students from one suburban Winnipeg school division who presented standing to satisfy the entrance requirements for admission to the University of Manitoba during the 1971-72 academic year. Each of these students was admitted to the University of Manitoba on the basis of satisfactory academic performance in Grade XII as measured by the student's high school. The basic problem of this phase of the study was to determine whether the Grade XII record as certified by the high school is an accurate predictor of success at the university.

In this phase of the study the average mark as well as the subject marks obtained by each student in Grade XII were computed, analysed, and statistically compared with the grade point average obtained by the same student in the first year of university work. The calculation of the means, standard deviations, and correlation coefficients for this group of students is shown in Tables XX to XXIV, inclusive. The results are summarized in Table XXV.

Interpretation of the Data

The correlation coefficient measures the degree to which two variables are associated. Table XXV shows the correlation coefficients for the Grade XII record, the average and the subject marks, and the corresponding university grade point average. The correlation coefficient (r) of .705 for the Grade XII average and the university grade point average can be considered moderately high. Similarily, the 'r' of .779 for the Physics mark and the corresponding university grade point average, the 'r' of .634 for the Mathematics mark and the corresponding university grade point average, and the 'r' of .678 for the Chemistry mark and the corresponding university grade point average can be considered moderately high. The moderately high correlation between the Grade XII average, the Grade XII Physics marks, the Grade XII Mathematics marks, the Grade XII Chemistry marks and the corresponding grade point average in the first year of university work indicates that there is a marked tendency for the marks above the mean in high school to be associated with grade point averages above the mean in the first year of university work. Similarily, the moderately high correlation coefficients between the Grade XII academic record and the university grade point averages indicates that there is a marked tendency for the marks below the mean in high school to be associated with grade point averages below the

mean in the first year of university work.

To determine whether the relationship between academic achievement in Grade XII and the university grade point average is significant, the hypothesis that a true correlation is zero was tested. This is the "null hypothesis" and it is assumed that any observed relationship is due to random chance. From Table A.7 Appendix A[21] the values of 'r' can be obtained which would be required to meet the requirements of significance at the one percent and five percent levels of significance. Entering Table A.7 Appendix A with degrees of freedom equal to N-2 where N is the number of pairs, it can be seen that with 31 degrees of freedom 'r' would need to be .344 to be significant at the five percent level and .443 to be significant at the one percent level. It can be seen that with 26 degrees of freedom 'r' would need to be .375 to be significant at the 5 percent level and .479 to be significant at the one percent level, and with 19 degrees of freedom 'r' would need to be .433 to be significant at the five percent level and .549 to be significant at the one percent level. Thus, the null hypothesis is untenable for the Grade XII average, as well as for the individual Grade XII subjects and the corresponding grade point average in the first year of university work.

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21 Champion, Dean J., Basic Statistics for Social Research, Chandler Publishing Co., Scranton, Pennsylvania, 1970, p.268

Prediction:

In this phase of the study, prediction was considered in relation to predicting measurements of one quantitative variable from the knowledge of another quantitative variable. This method was based on the Grade XII average and the university grade point average, the individual Grade XII subjects and the university grade point average, and the correlation coefficient or the degree of relationship of these measures.

In predicting measurements of one quantitative variable from the knowledge of another quantitative variable, the extent to which the predicted measure fails to correspond to the actual measure is indicated by 'the standard error of estimate' (Sy.x) and can be computed by using the following formula:

$$Sy.x = SDy\sqrt{1 - r^2} \quad 22$$

where SDy is the standard deviation of the university grade point average (the Y scores) and r is the correlation coefficient between the academic achievement in Grade XII and the university grade point average. The reduction in errors of prediction can be calculated by the use of the index of forecasting efficiency (E). It is given by the formula $E = 1 - \sqrt{1 - r^2}$ [23], where again, r is the correlation

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[22] Edwards, Allen L., Statistical Analysis, Holt, Rinehart, and Winston Inc., New York, 1969, pp. 76-77

[23] Best, J.W. Research in Education, Prentice-Hall Inc., Englewood Cliffs, N.J., 1965, p. 241

coefficient between the academic achievement in Grade XII and the University grade point average.

Knowing the extent to which there are errors in the prediction of one measure from the knowledge of another measure and having an indication of the reduction of errors of prediction, the 'regression equation' may be employed to find a value of Y (the university grade point average) for any given value of X (Grade XII marks). The formula for the regression equation is given by: $Y' = My + \frac{SDy}{SDx} r (X - Mx)$, where Y' is the predicted value of Y (the predicted university grade point average), SDy and SDx are the standard deviation of the Y and X scores, respectively, r is the correlation coefficient between the X and Y scores, X is the value of X (the Grade XII mark) for which we are predicting a value of Y, and Mx and My are the means of the X and Y scores, respectively.[24]

The date from Table XIX can now be used to evaluate the prediction of the university grade point average from the knowledge of the Grade XII academic record.

1. The Grade XII average:

The standard error of estimate is: $Sy.x = 1.14\sqrt{1 - .5} = .80$

The index of forecasting efficiency is: $E = 1 - \sqrt{1 - .5} =$

$.30 = 30\%$

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[24] Ibid., p. 233

Since the correlation coefficient between the Grade XII average and the first year university grade point average was moderately high (.705), the error of estimate would be .34 lower than the standard deviation. The index of forecasting efficiency is 30% indicating that the knowledge of the correlation coefficient would reduce errors of prediction by 30%.

It follows from this that the use of the regression equation would have some value in predicting the university grade point average from the knowledge of the Grade XII average. As an example of the use of this equation, a hypothetical Grade XII average of 75 will be used to obtain a university grade point average in the calculations which follow:

$$Y' = 2.31 + \frac{1.14}{9.23} (.705) (75 - 69.1) = 2.82$$

Hence, the most probable university grade point average would be 2.82 with an error of estimate of .80. Thus, the university grade point average would likely vary from 2.02 to 3.62 which gives a considerably narrower range than predicting the mean (2.31) as the university grade point average with an error of estimate equal to the standard deviation (1.14). In the latter case the predicted grade point average would lie within the range 1.17 to 3.45.

2. The Grade XII English Mark

The standard error of estimate is: $Sy.x = 1.14\sqrt{1 - .22} = 1.00$

The index of forecasting efficiency is: $E = 1 - \sqrt{1 - .22} =$

$.12 = 12\%$

The correlation coefficient between English marks in Grade XII and the university grade point average was relatively low (.474), and the standard error of estimate is only 0.14 lower than the standard deviation. The index of forecasting efficiency is 12% indicating that for Grade XII English marks the knowledge of the correlation coefficient would reduce errors of prediction by 12%.

3. The Grade XII Mathematics Mark

The standard error of estimate is: $Sy.x = 1.14\sqrt{1 - .4} = .88$

The index of forecasting efficiency is: $E = 1 - \sqrt{1 - .4} =$

$.23 = 23\%$

The correlation coefficient between the Grade XII Mathematics mark and the first year university grade point average was .634 and consequently the standard error of estimate is .26 lower than the standard deviation. The index of forecasting efficiency is 23% indicating that for Grade XII Mathematics marks the knowledge of the correlation coefficient would reduce errors of prediction by 23%.

4. The Grade XII Chemistry Mark

The standard error of estimate is: $Sy.x = 1.14\sqrt{1 - .46} = .83$

The index of forecasting efficiency is: $E = 1 - \sqrt{1 - .46} =$

$.27 = 27\%$

For Grade XII Chemistry marks the knowledge of the correlation coefficient would reduce errors in prediction by 27%. The calculation of a predicted first year university grade point average for a hypothetical Grade XII Chemistry mark of 60 follows:

$$Y' = 2.27 + \frac{1.14}{12.19}(.678)(60 - 69.7) = 1.66$$

The most probable first year university grade point average for a student who scored 60 in Grade XII Chemistry would be 1.66 with an error of estimate of .83. Thus, the university grade point average would likely vary from .83 to 2.49.

5. The Grade XII Physics Mark

The standard error of estimate is: $Sy.x = 1.32\sqrt{1 - .60} = .83$

The index of forecasting efficiency is: $E = 1 - \sqrt{1 - .60} =$

$.37 = 37\%$

For Grade XII Physics marks and the first year university grade point average the correlation coefficient was moderately high (.779), consequently the standard error of estimate is .49 lower than the standard deviation. The index of forecasting efficiency is 37% indicating that the knowledge of the correlation coefficient

would reduce errors of prediction by 37%. Table XXVI, shows in summary, the prediction of the first year university grade point average from the Grade XII academic record.

TABLE XX

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT FOR AVERAGE MARKS AS MEASURED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 81.0 | 3.00 | 11.9 | 0.69 | 141.61 | .4761 | 8.211 |
| 2 | 70.2 | 2.46 | 1.1 | 0.15 | 1.21 | .0225 | .165 |
| 3 | 74.2 | 2.38 | 5.1 | 0.07 | 26.01 | .0049 | .357 |
| 4 | 77.2 | 3.90 | 8.1 | 1.56 | 65.61 | 2.5281 | 12.879 |
| 5 | 70.2 | 2.05 | 1.1 | -0.26 | 1.21 | .0676 | -.286 |
| 6 | 56.6 | 0.20 | -12.5 | -2.11 | 156.25 | 4.4521 | 26.375 |
| 7 | 85.4 | 3.30 | 16.3 | 0.99 | 256.69 | .9801 | 16.137 |
| 8 | 56.4 | 2.20 | -12.7 | -0.11 | 161.29 | .0121 | 1.397 |
| 9 | 72.0 | 3.70 | 2.9 | 1.39 | 8.41 | 1.9321 | 4.031 |
| 10 | 56.8 | 0.60 | -12.3 | -1.71 | 151.29 | 2.9241 | 21.033 |
| 11 | 90.0 | 3.40 | 20.9 | 1.09 | 436.81 | 1.1881 | 22.781 |
| 12 | 80.2 | 3.75 | 11.1 | 1.44 | 123.21 | 2.0736 | 15.984 |
| 13 | 61.5 | 1.30 | -7.6 | -1.01 | 57.76 | 1.0201 | 7.676 |
| 14 | 68.2 | 3.80 | -0.9 | 1.49 | .81 | 2.2201 | -1.341 |
| 15 | 57.2 | 1.60 | -11.9 | -0.71 | 141.61 | .5041 | 8.449 |
| 16 | 59.6 | 1.69 | -9.5 | -0.62 | 90.25 | .3844 | 5.890 |
| 17 | 76.0 | 2.90 | 6.9 | 0.59 | 47.61 | .3481 | 4.071 |
| 18 | 71.2 | 1.81 | 2.1 | -0.50 | 4.41 | .2500 | -1.050 |
| 19 | 55.0 | 2.30 | -14.1 | -0.01 | 198.81 | .0001 | .141 |
| 20 | 77.2 | 3.62 | 8.1 | 1.31 | 65.61 | 1.7161 | 10.611 |
| 21 | 76.8 | 2.50 | 7.7 | 0.19 | 59.29 | .0361 | 1.463 |
| 22 | 67.8 | 2.00 | -1.3 | -0.31 | 1.69 | .0961 | .403 |
| 23 | 65.4 | 1.70 | -3.7 | -0.61 | 13.69 | .3721 | 2.257 |
| 24 | 69.0 | 3.22 | -0.1 | 0.91 | .01 | .8281 | -.091 |
| 25 | 56.4 | 0.00 | -12.7 | -2.31 | 161.29 | 5.3361 | 29.337 |
| 26 | 79.2 | 3.50 | 10.1 | 1.19 | 102.01 | 1.4161 | 12.019 |
| 27 | 65.4 | 2.63 | -3.7 | 0.32 | 13.69 | .1024 | -1.184 |
| 28 | 63.8 | 1.20 | -5.3 | -1.11 | 28.09 | 1.2321 | 5.883 |
| 29 | 75.6 | 3.50 | 6.5 | 1.19 | 42.25 | 1.4161 | 7.735 |
| 30 | 72.0 | 3.60 | 2.9 | 1.29 | 8.41 | 1.6641 | 3.741 |
| 31 | 65.5 | 0.60 | -3.6 | -1.71 | 12.96 | 2.9241 | 6.156 |
| 32 | 73.6 | 0.75 | 4.5 | -1.56 | 20.25 | 2.4336 | -7.020 |
| 33 | 54.6 | 0.90 | -14.5 | -1.41 | 210.25 | 1.9881 | 20.445 |
| | 2281.2 | 76.36 | | | 2810.34 | 42.9495 | 244.655 |

Mean: $\frac{\Sigma \text{Scores}}{N}$ : High School: 2.281.2/33 = 69.1

University: 76.36/33 = 2.31

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ High School: $\frac{2810.35}{33} = 9.23$

University: $\frac{42.9495}{33} = 1.14$

Correlation Coefficient (r): $\frac{\Sigma\ dx\ dy}{N\ (SDx)(SDy)}$

$$r = \frac{244.655}{33\ (9.23)(1.14)} = .705$$

TABLE XXI

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT FOR ENGLISH MARKS AS MEASURED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 79 | 3.00 | 8.6 | 0.69 | 73.96 | .4761 | 8.514 |
| 2 | 71 | 2.46 | 0.6 | 0.15 | .36 | .0225 | .090 |
| 3 | 84 | 2.38 | 13.6 | 0.07 | 184.96 | .0049 | .952 |
| 4 | 78 | 3.90 | 7.6 | 1.59 | 57.76 | 2.5281 | 12.084 |
| 5 | 69 | 2.05 | -1.4 | -0.26 | 1.96 | .0676 | .364 |
| 6 | 70 | 0.20 | -0.4 | -2.11 | .16 | 4.4521 | .844 |
| 7 | 82 | 3.30 | 11.6 | 0.99 | 134.56 | .9801 | 11.484 |
| 8 | 72 | 2.20 | 1.6 | -0.11 | 2.56 | .0121 | -.176 |
| 9 | 72 | 3.70 | 1.6 | 1.39 | 2.56 | 1.9321 | 2.224 |
| 10 | 68 | 0.60 | -2.4 | -1.71 | 5.76 | 2.9241 | 4.104 |
| 11 | 78 | 3.40 | 7.6 | 1.09 | 57.76 | 1.1881 | 8.284 |
| 12 | 79 | 3.75 | 8.6 | 1.44 | 73.96 | 2.0736 | 12.384 |
| 13 | 58 | 1.30 | -12.4 | -1.01 | 153.76 | 1.0201 | 12.524 |
| 14 | 78 | 3.80 | 7.6 | 1.49 | 57.76 | 2.2201 | 11.324 |
| 15 | 55 | 1.60 | -15.4 | -0.71 | 237.16 | .5041 | 10.934 |
| 16 | 65 | 1.69 | -5.4 | -0.62 | 29.16 | .3844 | 3.348 |
| 17 | 72 | 2.90 | 1.6 | 0.59 | 2.56 | .3481 | .944 |
| 18 | 80 | 1.81 | 9.6 | -0.50 | 92.16 | .2500 | -4.800 |
| 19 | 62 | 2.30 | -8.4 | -0.01 | 70.56 | .0001 | .084 |
| 20 | 69 | 3.62 | -1.4 | 1.31 | 1.96 | 1.7161 | 1.834 |
| 21 | 72 | 2.50 | 1.6 | 0.19 | 2.56 | .0361 | .304 |
| 22 | 77 | 2.00 | 6.6 | -0.31 | 43.56 | .0961 | -2.046 |
| 23 | 65 | 1.70 | -5.4 | -0.61 | 29.16 | .3721 | 3.294 |
| 24 | 54 | 3.22 | -16.4 | 0.91 | 268.96 | .8281 | -14.924 |
| 25 | 55 | 0.00 | -15.4 | -2.31 | 237.16 | 5.3361 | 35.574 |
| 26 | 66 | 3.50 | -4.4 | 1.19 | 19.36 | 1.4161 | -5.236 |
| 27 | 72 | 2.63 | 1.6 | 0.32 | 2.56 | .1024 | .512 |
| 28 | 67 | 1.20 | -3.4 | -1.11 | 11.56 | 1.2321 | 3.774 |
| 29 | 75 | 3.50 | 4.6 | 1.19 | 21.16 | 1.4161 | 5.474 |
| 30 | 80 | 3.60 | 9.6 | 1.29 | 92.16 | 1.6641 | 12.384 |
| 31 | 58 | 0.60 | -12.4 | -1.71 | 153.76 | 2.9241 | 21.204 |
| 32 | 84 | 0.75 | 13.6 | -1.56 | 184.96 | 2.4336 | -21.216 |
| 33 | 58 | 0.90 | -12.4 | -1.41 | 153.76 | 1.9881 | 17.484 |
| | 2324 | 76.36 | | | 2461.58 | 42.9495 | 153.926 |

Mean: $\frac{\sum \text{Scores}}{N}$ High School: 2324/33 = 70.4

University: 76.36/33 = 2.31

Standard Deviation: $\sqrt{\frac{\sum d^2}{N}}$ High School: $\frac{2461.58}{33} = 8.63$

University: $\frac{42.9495}{33} = 1.14$

Correlation Coefficient (r): $\frac{\sum dx\ dy}{N\ (SDx)(SDy)}$

$$r = \frac{153.926}{33\ (8.63)(1.14)} = .474$$

TABLE XXII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS AND CORRELATION COEFFICIENT FOR MATHEMATICS MARKS AS MEASURED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 82 | 3.30 | 13.4 | 0.99 | 179.56 | .9801 | 13.266 |
| 2 | 71 | 2.46 | 2.4 | 0.15 | 5.76 | .0225 | .360 |
| 3 | 68 | 2.38 | -0.6 | 0.07 | .36 | .0049 | -.042 |
| 4 | 81 | 3.90 | 12.4 | 1.59 | 153.76 | 2.5281 | 19.716 |
| 5 | 71 | 2.05 | 2.4 | -0.26 | 5.76 | .0676 | -.624 |
| 6 | 59 | 0.20 | -9.6 | -2.11 | 92.16 | 4.4521 | 20.256 |
| 7 | 87 | 3.30 | 18.4 | 0.99 | 338.56 | .9801 | 18.216 |
| 8 | 50 | 2.20 | -18.6 | -0.11 | 345.96 | .0121 | 2.046 |
| 9 | 65 | 3.70 | -3.6 | 1.39 | 12.96 | 1.9321 | -5.004 |
| 10 | 50 | 0.60 | -18.6 | -1.71 | 345.96 | 2.9241 | 31.806 |
| 11 | 93 | 3.40 | 24.4 | 1.09 | 595.36 | 1.1881 | 26.596 |
| 12 | 73 | 3.75 | 4.4 | 1.44 | 19.36 | 2.0736 | 6.336 |
| 13 | 71 | 1.30 | 2.4 | -1.01 | 5.76 | 1.0201 | -2.424 |
| 14 | 87 | 3.80 | 18.4 | 1.49 | 338.56 | 2.2201 | 27.416 |
| 15 | 83 | 1.60 | 14.4 | -0.71 | 207.36 | .5041 | -10.224 |
| 16 | 54 | 1.69 | -14.6 | -0.62 | 213.16 | .3844 | 9.052 |
| 17 | 72 | 2.90 | 3.4 | 0.59 | 11.56 | .3481 | 2.006 |
| 18 | 57 | 1.81 | -11.6 | -0.50 | 134.56 | .2500 | 5.800 |
| 19 | 50 | 2.30 | -18.6 | -0.01 | 345.96 | .0001 | .186 |
| 20 | 80 | 3.62 | 11.4 | 1.31 | 129.96 | 1.7161 | 14.934 |
| 21 | 87 | 2.50 | 18.4 | 0.19 | 338.56 | .0361 | 3.496 |
| 22 | 69 | 2.00 | 0.4 | -0.31 | .16 | .0961 | -.124 |
| 23 | 61 | 1.70 | -7.6 | -0.61 | 57.76 | .3721 | 4.636 |
| 24 | 69 | 3.22 | 0.4 | 0.91 | .16 | .8281 | .364 |
| 25 | 67 | 0.00 | -1.6 | -2.31 | 2.56 | 5.3361 | 3.696 |
| 26 | 86 | 3.50 | 17.4 | 1.19 | 302.76 | 1.4161 | 20.706 |
| 27 | 56 | 2.63 | -12.6 | 0.32 | 158.76 | .1024 | -4.032 |
| 28 | 54 | 1.20 | -14.6 | -1.11 | 213.16 | 1.2321 | 16.206 |
| 29 | 79 | 3.50 | 10.4 | 1.19 | 108.16 | 1.4161 | 12.376 |
| 30 | 57 | 3.60 | -11.6 | 1.29 | 134.56 | 1.6641 | 14.964 |
| 31 | 58 | 0.60 | -10.6 | -1.71 | 112.36 | 2.9241 | 18.126 |
| 32 | 65 | 0.75 | -3.6 | -1.56 | 12.96 | 2.4336 | 5.616 |
| 33 | 51 | 0.90 | -17.6 | -1.41 | 309.76 | 1.9881 | 24.816 |
| | 2263 | 76.36 | | | 5234.08 | 43.4535 | 300.520 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ High School: 2263/33 = 68.6

University: 76.36/33 = 2.31

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ High School: $\frac{5234.08}{33} = 12.59$

University: $\frac{42.9495}{33} = 1.14$

Correlation Coefficient (r): $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx)(SDy)}}$

$$r = \frac{300.520}{33 \text{ (12.59) (1.14)}} = .634$$

TABLE XXIII

CALCULATION OF THE MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT FOR CHEMISTRY MARKS AS MEASURED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 84 | 3.00 | 14.3 | 0.73 | 204.49 | .5329 | 10.439 |
| 2 | 71 | 2.46 | 1.3 | 0.19 | 1.69 | .0361 | .247 |
| 3 | 81 | 3.90 | 11.3 | 1.63 | 127.69 | 2.6569 | 18.419 |
| 4 | 75 | 2.05 | 5.3 | -0.22 | 28.09 | .0484 | -1.166 |
| 5 | 54 | 0.20 | -15.7 | -2.07 | 246.49 | 4.2849 | 32.499 |
| 6 | 90 | 3.30 | 20.3 | 1.03 | 412.09 | 1.0609 | 20.909 |
| 7 | 50 | 2.20 | -19.7 | -0.07 | 388.09 | .0049 | 1.379 |
| 8 | 74 | 3.70 | 4.3 | 1.43 | 18.49 | 2.0449 | 6.149 |
| 9 | 50 | 0.60 | -19.7 | -1.67 | 388.09 | 2.7889 | 32.899 |
| 10 | 91 | 3.40 | 21.3 | 1.13 | 453.69 | 1.2769 | 24.069 |
| 11 | 59 | 1.30 | -10.7 | -0.97 | 114.49 | .9409 | 10.379 |
| 12 | 92 | 3.80 | 22.3 | 1.53 | 497.29 | 2.3409 | 34.119 |
| 13 | 76 | 1.60 | 6.3 | -0.67 | 39.69 | .4489 | -4.221 |
| 14 | 50 | 1.69 | -19.7 | -0.58 | 388.09 | .3364 | 11.426 |
| 15 | 80 | 2.90 | 10.3 | 0.63 | 106.09 | .3969 | 6.489 |
| 16 | 67 | 1.81 | -2.7 | -0.46 | 7.29 | .2116 | 1.242 |
| 17 | 79 | 3.62 | 9.3 | 1.35 | 86.49 | 1.8925 | 12.555 |
| 18 | 76 | 2.50 | 6.3 | 0.23 | 39.69 | .0529 | 1.449 |
| 19 | 61 | 2.00 | -8.7 | -0.27 | 75.69 | .0729 | 2.349 |
| 20 | 70 | 1.70 | 0.3 | -0.57 | .09 | .3249 | -.171 |
| 21 | 71 | 3.22 | 1.3 | 0.95 | 1.69 | .9025 | 1.235 |
| 22 | 53 | 0.00 | -16.7 | -2.27 | 278.89 | 5.1529 | 37.909 |
| 23 | 86 | 3.50 | 16.3 | 1.23 | 265.69 | 1.5129 | 20.049 |
| 24 | 59 | 2.63 | -10.7 | 0.36 | 114.49 | .1296 | -3.852 |
| 25 | 55 | 1.20 | -14.7 | -1.07 | 216.69 | 1.1449 | 15.729 |
| 26 | 67 | 3.60 | -2.7 | 1.33 | 7.29 | 1.7689 | -3.591 |
| 27 | 74 | 0.75 | 4.3 | -1.52 | 18.49 | 2.3104 | -6.536 |
| 28 | 56 | 0.90 | 13.7 | -1.37 | 187.69 | 1.8769 | -18.769 |
| | 1951 | 63.53 | | | 4714.72 | 36.5535 | 263.633 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$ High School: 1951/28 = 69.7

University: 63.53/28 = 2.27

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ High School: $\frac{4714.72}{28} = 12.19$

University: $\frac{36.5535}{28} = 1.14$

Correlation Coefficient (r) $\frac{\Sigma \text{ dx dy}}{N \text{ (SDx)(SDy)}}$

$$r = \frac{263.633}{28 \text{ (12.19) (1.14)}} = .678$$

TABLE XXIV

CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENT FOR PHYSICS MARKS AS MEASURED BY THE HIGH SCHOOL (X) AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (Y)

| N | X | Y | dx | dy | $dx^2$ | $dy^2$ | dx dy |
|---|---|---|---|---|---|---|---|
| 1 | 77 | 3.00 | 5.4 | 0.85 | 29.16 | .7225 | 4.590 |
| 2 | 69 | 3.90 | -2.6 | 1.75 | 6.76 | 3.0625 | -4.550 |
| 3 | 73 | 2.05 | 1.4 | -0.10 | 1.96 | .0100 | -.140 |
| 4 | 60 | 0.20 | -11.6 | -1.95 | 134.56 | 3.8025 | 22.620 |
| 5 | 87 | 3.30 | 15.4 | 1.15 | 237.16 | 1.3225 | 17.710 |
| 6 | 69 | 3.70 | -2.6 | 1.55 | 6.76 | 2.4025 | -4.030 |
| 7 | 50 | 0.60 | -21.6 | -1.55 | 466.56 | 2.4025 | 33.480 |
| 8 | 93 | 3.40 | 21.4 | 1.25 | 457.96 | 1.5625 | 26.750 |
| 9 | 58 | 1.30 | -13.6 | -0.85 | 184.96 | .7225 | 11.560 |
| 10 | 84 | 3.80 | 12.4 | 1.65 | 153.76 | 2.7225 | 20.460 |
| 11 | 72 | 1.60 | 0.4 | -0.55 | .16 | .3025 | -.220 |
| 12 | 80 | 2.90 | 8.4 | 0.75 | 70.56 | .5625 | 6.300 |
| 13 | 83 | 3.62 | 11.4 | 1.47 | 129.96 | 2.1609 | 16.758 |
| 14 | 73 | 1.70 | 1.4 | -0.45 | 1.96 | .2025 | -.630 |
| 15 | 82 | 3.22 | 10.4 | 1.07 | 108.16 | 1.1449 | 11.128 |
| 16 | 59 | 0.00 | -12.6 | -2.15 | 158.76 | 4.6225 | 27.090 |
| 17 | 84 | 3.50 | 12.6 | 1.35 | 158.76 | 1.8225 | 17.010 |
| 18 | 68 | 1.20 | -3.6 | -0.95 | 12.96 | .9025 | 3.420 |
| 19 | 64 | 0.60 | -7.6 | -1.55 | 57.76 | 2.4025 | 11.780 |
| 20 | 69 | 0.75 | -2.6 | -1.40 | 6.76 | 1.9600 | 3.640 |
| 21 | 50 | 0.90 | -21.6 | -1.25 | 466.56 | 1.5625 | 27.000 |
| | 1504 | 45.24 | | | 2851.96 | 36.3783 | 251.726 |

Mean: $\frac{\Sigma \text{ Scores}}{N}$

High School: 1504/21 = 71.6

University: 45.24/21 = 2.15

Standard Deviation: $\sqrt{\frac{\Sigma d^2}{N}}$ High School: $\frac{2851.96}{21} = 11.65$

University: $\frac{36.3783}{21} = 1.32$

Correlatinn Coefficient (r) $\frac{\Sigma dx\ dy}{N\ (SDx)(SDy)}$

$$r = \frac{251.726}{21\ (11.65)(1.32)} = .779$$

TABLE XXV

SUMMARY OF CALCULATION OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS FOR GRADE XII MARKS MEASURED BY THE HIGH SCHOOL AND CORRESPONDING UNIVERSITY GRADE POINT AVERAGES (GPA)

| MEAN | | STANDARD DEVIATION | | CORRELATION COEFFICIENT (r) |
|---|---|---|---|---|
| GRADE XII MARKS | UNIVERSITY GPA | GRADE XII MARKS | UNIVERSITY GPA | |
| AVERAGE MARKS 69.1 | 2.31 | 9.23 | 1.14 | .705 |
| ENGLISH MARKS 70.4 | 2.31 | 8.63 | 1.14 | .474 |
| MATHEMATICS MARKS 68.6 | 2.31 | 12.59 | 1.14 | .634 |
| CHEMISTRY MARKS 69.7 | 2.27 | 12.19 | 1.14 | .678 |
| PHYSICS MARKS 71.6 | 2.15 | 11.65 | 1.32 | .779 |

TABLE XXVI

PREDICTION OF FIRST YEAR UNIVERSITY GRADE POINT AVERAGE (GPA) FROM THE GRADE XII ACADEMIC RECORD

| GRADE XII | | UNIVERSITY GPA | r | Sy.x | E |
|---|---|---|---|---|---|
| AVERAGE MARKS | 69.1 | 2.31 | .705 | .80 | 30% |
| ENGLISH MARKS | 70.4 | 2.31 | .474 | 1.00 | 12% |
| MATHEMATICS MARKS | 68.6 | 2.31 | .634 | .88 | 23% |
| CHEMISTRY MARKS | 69.7 | 2.27 | .678 | .83 | 27% |
| PHYSICS MARKS | 71.6 | 2.15 | .779 | .83 | 37% |

| | REGRESSION EQUATION |
|---|---|
| AVERAGE MARKS | $Y' = 2.31 + \frac{1.14}{9.23} (.705) (X-69.1)$ |
| ENGLISH MARKS | $Y' = 2.31 + \frac{1.14}{8.63} (.474) (X-70.4)$ |
| MATHEMATICS MARKS | $Y' = 2.31 + \frac{1.14}{12.59} (.634) (X-68.6)$ |
| CHEMISTRY MARKS | $Y' = 2.27 + \frac{1.14}{12.19} (.678) (X-69.7)$ |
| PHYSICS MARKS | $Y' = 2.15 = \frac{1.32}{11.65} (.779) (X-71.6)$ |

WHERE X IS THE ACTUAL GRADE XII MARK AND Y' IS THE PREDICTED UNIVERSITY GRADE POINT AVERAGE.

Summary:

This phase of the study consisted of all the students from one suburban Winnipeg school division who presented standing to satisfy the entrance requirements for admission to the University of Manitoba during the 1971 - 72 academic year. Each of these students was admitted to the University on the basis of satisfactory academic performance in Grade XII as certified by the student's high school. It was the purpose of this chapter to determine whether the Grade XII record as certified by the individual high school is an accurate predictor of success in the first year of university work. The means, standard deviations, and correlation coefficients were calculated and prediction was considered in relation to predicting the university grade point average from the knowledge of the Grade XII academic record.

It was found that the standard deviation of the high school average as well as the standard deviation of the individual high school subjects was relatively high. The standard deviations were 9.23 for the Grade XII average, 8.63 for the Grade XII English marks, 12.59 for Grade XII Mathematics marks, 12.19 for Grade XII Chemistry marks and 11.65 for Grade XII Physics marks. The magnitude of the standard deviation indicates a tendency toward a high degree of variability in achievement in Grade XII. The magnitude of the standard deviations of the corresponding university grade point averages was 1.14, with the exception that for the Physics group in Grade XII the standard deviation of the corresponding university grade point average was 1.32.

Thus, the magnitude of the standard deviation of the university grade point averages indicates a tendency toward a high degree of variability in the first year of university work.

The calculation of the correlation coefficients indicated a moderately high degree of relationship between academic achievement in Grade XII and the grade point average in the first year of university work. For the Grade XII average, knowledge of the correlation coefficient was found to reduce errors of prediction by 30%. The standard error of estimate was found to be .80 as compared to a standard deviation of 1.14. For Mathematics marks in Grade XII, knowledge of the correlation coefficient was found to reduce errors of prediction by 23%. The standard error of estimate was found to be .88 as compared to a standard deviation of 1.14. For Chemistry marks in Grade XII, knowledge of the correlation coefficient was found to reduce errors of prediction by 27%. The standard error of estimate was found to be .83 as compared to a standard deviation of 1.14. For Physics marks in Grade XII, knowledge of the correlation coefficient was found to reduce errors of prediction by 37%. The standard error of estimate was found to be .83 as compared to a standard deviation of 1.32. For English marks in Grade XII, knowledge of the correlation coefficient was found to reduce errors of prediction by only 12% and the error of estimate was found to be only .14 lower than the standard deviation.

# CHAPTER VI

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

In the first phase of this study it was found that the correlation coefficients which resulted from a comparison of the first year university grade point average with the Grade XII average and with the grades in individual Grade XII subjects as measured by the high school were consistently higher than the correlation coefficients which resulted from a comparison of the first year university grade point average with the Grade XII average and with the grades in individual Grade XII subjects as measured by Departmental Examinations with one exception, grades in English on Departmental Examinations. However, neither the achievement as measured by the school nor the achievement on Departmental Examinations correlated highly with the first year university grade point average nor was the difference between them significant.

In the second phase of this study the calculation of the correlation coefficient indicated a much higher degree of relationship between the first year university grade point average and the Grade XII academic record after the influence of provincial examination standards was totally removed.

It was found that the correlation coefficient is of value in predicting the first year university grade point average from a knowledge of the Grade XII academic record as measured by school marks alone.

Implications of the Findings

The problem in the first phase of this study was to determine whether a significant difference existed between the correlation coefficient which resulted from a comparison of academic achievement in Grade XII as measured by Departmental Examinations with the grade point average in the first year of university work and the correlation coefficient which resulted from a comparison of academic achievement in Grade XII as measured by the high school with the grade point average in the first year of university work. According to the results of this study no significant difference existed between the two resulting correlation coefficients. Thus, as a selective device for university admissions the Grade XII academic record as certified by the high school and the scores on departmental examinations have equal value. However, since academic achievement in Grade XII, as measured by the high school, is a cumulative process it offers positive time advantages in terms of academic guidance for the students before they leave the high school in June, for administrative planning in the University, and for parents and students alike in making the necessary preparations for the student to attend university or some other institute of learning. Although this study does not provide evidence, it is possible that the opportunity for positive academic guidance under conditions realistic as to the selection of area of study before

the student leaves the school, may reduce the number of failures at the university.

The problem in the second phase of this study was to determine whether the Grade XII record as certified by the high school was an accurate predictor of success at the university. According to the results of this study the accuracy of prediction of the grade point average in the first year of university work from the knowledge of the Grade XII academic record is moderately high. The correlation coefficients indicated a moderately high degree of relationship between the Grade XII average, Mathematics marks in Grade XII, Chemistry marks in Grade XII, Physics marks in Grade XII, and the corresponding grade point average in the first year of university work. However, all persons concerned would have to be aware of the limitations of such predictions. Students, for instance, would have to realize that they would have to continue to work diligently at the university. Students, parents, and teachers would have to realize that the statistical analysis was based on a group effort, and an individual in a group may always prove to be the exception to that group. Thus, any future predictions would be more applicable in terms of a group rather than in terms of an individual in a group.

Recommendations

Although the findings of this study are limited by the scope and conditions of the study itself, certain recommendations are suggested by these findings which might be of value in terms of success at the university.

The findings of this study seem to indicate a moderately high correlation between academic achievement in Grade XII and success in the first year of university work. It is suggested, therefore, that future studies consider the relationship between the Grade XII academic record and success at the university as measured by graduation. Future investigations might also consider the relationship between success in the first year of university work and success at the university as measured by graduation.

Since success at the university is a function of an interaction of many complex factors, it is suggested that future predictive research include characteristics such as work habits and time spent on study in relation to success at university.

Since academic achievement is a cumulative process, it would be desirable to conduct longitudinal studies from the junior high school level through university. This would help students, parents, and guidance directors to make a realistic assessment of a student's academic status and aspirations before the students enter into the university.

# BIBLIOGRAPHY

Best, J.W. Research in Education. Englewood Cliffs, N.J., Prentice-Hall, Inc., 1965.

Black, Donald B. "A Comparison of the Performance on Selected Standardized Tests to That on the Alberta Grade XII Departmental Examinations of a Select Group of University of Alberta Freshmen" Alberta Journal of Educational Research, September 1959, Vol. 5, pp. 180 - 190

Champion, Dean J. Basic Statistics for Social Research. Scranton, Pennsylvania, Chandler Publishing Company, 1970.

Conklin, R.C. and Ogston, D.G. "Prediction of Academic Success for Freshman at the University of Calgary" Alberta Journal of Educational Research, September 1965, Vol. 14, pp. 185 - 191.

Edwards, Allen L. Statistical Analysis. New York, Holt-Rinehart and Winston, Inc., 1969.

Endler, Norman S. and Synder, Larry S. "An Examination of Some Intellectual and Non-Intellectual Factors in the Prediction of Academic Achievement at the University Level" Ontario Journal of Educational Research, Winter 1965, Vol. 7, pp. 147 - 154.

Endler, Norman S. and Steinberg, Danny. "Prediction of Academic Achievement at the University Level" Personnel and Guidance Journal, April 1963, Vol. 41., pp. 694- 699.

Fleming, W.G. "Factors Affecting the Predictive Accuracy of Ontario Grade XIII Results" Bulletin No. 16, Department of Educational Research, University of Toronto, Toronto, 1955, pp. 25 - 26.

Ferguson, George A., Statistical Analysis in Psychology and Education. New York, McGraw - Hill, Inc., 1971.

Pollock, Harold, "High School Averages and Supplementals as Predictors of First Year University Success" Unpublished Master's Thesis, University of Manitoba, Winnipeg, 1959.

Richards, James M., Holland, John L., and Lutz, Sandra W., "Prediction of Student Accomplishment in College" Journal of Educational Psychology, April, 1967, Vol. 58, pp. 343 - 355.

Sharp, Bert L. "College Achievement: Its Relationship to High School Achievement Experiences and Test Scores" Personnel and Guidance Journal, November, 1962, Vol. 41, pp. 247 - 250.

Traub, Ross E. "Reflections on Some Popular Criticisms of University Entrance Examinations" The Bulletin, March, 1969, Vol. 49, pp. 93 - 100.

Tyler, L.E. Tests and Measurements, Englewood Cliffs, N.J., Prentice-Hall, Inc., 1965.

Winnipeg Free Press. Newspaper item pertaining to the University of Manitoba, 1972.

# APPENDIX

Raw Scores on Departmental Examinations
in Grade XII and Grade XII Marks as
Certified by the High School in June 1970
as well as
Raw Scores of Final Grade XII Marks
as Certified by the High School for the
1970 - 1971 Academic Year.

TABLE XXVII

MARKS SCORED ON GRADE XII DEPARTMENTAL EXAMINATIONS IN JUNE 1970

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 55 | 50 | 65 | | 59 | 55 | | | 56.8 |
| 2 | 27 | 88 | | | 60 | 57 | | 55 | 57.4 |
| 3 | 42 | 84 | 52 | | | 75 | | | 67.0 |
| 4 | 53 | | | 59 | | | 50 | | 54.0 |
| 5 | 68 | | | | | | 66 | 57 | 63.7 |
| 6 | 44 | 68 | | | 42* | | | 72 | 56.5 |
| 7 | 55 | 65 | | | 62 | | 65 | | 61.8 |
| 8 | 65 | | | 64 | | | 54 | | 59.0 |
| 9 | 65 | 65 | | | 68 | 66 | | | 66.3 |
| 10 | 72 | | 67 | 61 | | | 58 | | 64.5 |
| 11 | 69 | 87 | | | 71 | 72 | | | 74.8 |
| 12 | 56 | 66 | | | 60 | 68 | | | 62.5 |
| 13 | 67 | | | | 85 | | 58 | | 70.0 |
| 14 | 53 | 66 | | | 62 | 80 | | | 65.3 |
| 15 | | 82 | | | 89 | 79 | | 83 | 81.3 |
| 16 | 54 | 81 | | | 66 | 66 | | | 66.8 |
| 17 | 56 | | | 50 | | | | 61 | 53.0 |
| 18 | 58 | 74 | | | 70 | | | 67 | 67.3 |
| 19 | 40* | | | 53 | | | 38* | | 43.7 |
| 20 | | 77 | | | 70 | | 67 | | 71.3 |
| 21 | | 18* | | | 50 | | | 54 | 40.7 |
| 22 | 73 | 88 | | | | 75 | | | 78.7 |
| 23 | 58 | | | 59 | | | 67 | 41 | 56.3 |
| 24 | 69 | | 51 | 53 | | | 37 | | 52.5 |
| 25 | 62 | 60 | | | 41 | | | | 54.3 |
| 26 | 63 | | | 54 | | | 52 | 43* | 53.0 |
| 27 | 63 | | 61 | | | | 66 | | 63.5 |
| 28 | 54 | 43* | | | 46* | 56 | | | 49.8 |
| 29 | 65 | | | | 50 | | 59 | 51 | 56.3 |
| 30 | 61 | 53 | | | 59 | | | 50 | 55.8 |

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 59 | 75 | | | 46 | 72 | | 51 | 60.6 |
| 32 | 70 | 82 | | | | 75 | | | 75.7 |
| 33 | 56 | | | 60 | | | 54 | 53 | 55.8 |
| 34 | 66 | | | | 59 | | | 54 | 59.7 |
| 35 | 68 | 64 | | | | | 54 | | 62.0 |
| 36 | | | 63 | | | | 78 | 88 | 76.3 |
| 37 | | 63 | | | 73 | | | 51 | 62.3 |
| 38 | | 61 | 53 | | 50 | | 50 | | 53.5 |
| 39 | 62 | 87 | | | | 57 | | | 68.7 |
| 40 | | 64 | 58 | | | | | 53 | 58.5 |
| 41 | | | | 60 | | | 66 | 56 | 60.7 |
| 42 | | | 66 | 58 | | | | 51 | 58.5 |

* Wrote the Departmental August 1970 Supplemental.

Legend:

E - English
M - Mathematics
H - History
G - Geography
C - Chemistry
P - Physics
B - Biology
F - French

TABLE XXVIII

FINAL MARKS IN GRADE XII AS MEASURED BY THE HIGH SCHOOL FOR THE ACADEMIC YEAR ENDING IN JUNE 1970

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | 60 | 58 | | 59 | 59 | | | 60.2 |
| 2 | 38 | 77 | | | 59 | 57 | | 62 | 58.6 |
| 3 | 57 | 74 | 71 | | 73 | 81 | | | 71.2 |
| 4 | 60 | 53 | 62 | 55 | | | 56 | | 57.2 |
| 5 | 67 | 74 | | | 70 | | 69 | 65 | 69.0 |
| 6 | 50 | 63 | | 66 | 66 | | | 71 | 63.2 |
| 7 | 58 | 55 | | 70 | 66 | | 66 | | 63.0 |
| 8 | 72 | 59 | 76 | 60 | | | 59 | | 66.3 |
| 9 | 60 | 69 | 70 | | 62 | 64 | | | 65.0 |
| 10 | 63 | 62 | 66 | 71 | | | 63 | | 67.7 |
| 11 | 57 | 78 | | | 81 | 61 | | 72 | 69.8 |
| 12 | 54 | 64 | 75 | | 62 | 68 | | | 64.6 |
| 13 | 67 | 72 | | | 74 | | 66 | 83 | 72.4 |
| 14 | 52 | 61 | 66 | | 61 | 70 | | | 62.0 |
| 15 | 67 | 82 | 82 | | | 79 | | 95 | 82.4 |
| 16 | 50 | 52 | 75 | | 55 | 50 | | | 56.4 |
| 17 | 42 | 84 | | 70 | | | 74 | | 67.5 |
| 18 | 50 | 77 | | 77 | 81 | | | 71 | 71.2 |
| 19 | 50 | 50 | 61 | 64 | | | 53 | | 55.6 |
| 20 | 73 | 71 | | 73 | 71 | | 67 | | 71.0 |
| 21 | 78 | 51 | | | 52 | | | 46 | 56.8 |
| 22 | 79 | 82 | | | 80 | 78 | | 73 | 78.4 |
| 23 | 54 | | 73 | 68 | | | 65 | 54 | 62.8 |
| 24 | 60 | 50 | 47 | 68 | | | 50 | | 55.0 |
| 25 | 50 | 54 | | | 53 | 57 | 70 | | 56.8 |
| 26 | 73 | 64 | | 73 | | | 66 | 45 | 64.3 |
| 27 | 75 | 75 | 73 | | | | 64 | | 71.8 |
| 28 | 55 | 38* | 75 | | 52 | 54 | | | 54.8 |
| 29 | 67 | 70 | | | 60 | | 71 | 57 | 65.0 |
| 30 | 63 | 58 | | | 55 | | 69 | 60 | 61.0 |

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 44 | 71 | | | 64 | 62 | | 54 | 59.0 |
| 32 | 42 | 65 | 79 | | 66 | 70 | | | 64.4 |
| 33 | 62 | | 71 | 67 | | | 62 | 55 | 62.6 |
| 34 | 52 | | | 62 | 67 | 66 | | 64 | 66.2 |
| 35 | 41 | 40 | | 51 | | | 54 | | 45.0 |
| 36 | 70 | 70 | 70 | | | | 79 | 93 | 76.4 |
| 37 | 70 | 63 | | | 67 | | 74 | 70 | 68.8 |
| 38 | 70 | 55 | 67 | | 56 | | 60 | | 61.6 |
| 39 | 52 | 77 | | | 65 | 57 | | 59 | 62.0 |
| 40 | | 62 | 77 | | | | | 59 | 66.0 |
| 41 | 70 | | 73 | 76 | | | 65 | 66 | 70.0 |
| 42 | 72 | | 82 | 77 | | | | 58 | 72.3 |

* Wrote the School Supplemental August 1970.

Legend:

E - English
M - Mathematics
H - History
G - Geography
C - Chemistry
P - Physics
B - Biology
F - French

TABLE XXIX

FINAL MARKS IN GRADE XII AS MEASURED BY THE HIGH SCHOOL FOR THE ACADEMIC YEAR ENDING IN JUNE 1971

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 79 | 82 | 83 | | 84 | 77 | | | 81.0 |
| 2 | 71 | 71 | | | 71 | | 72 | 66 | 70.2 |
| 3 | 61 | 54 | 71 | 53 | | | 58 | | 57.4 |
| 4 | 84 | 68 | 74 | | | | 79 | 66 | 74.2 |
| ** 5 | 78 | 81 | | | 81 | 69 | | | 77.2 |
| 6 | 69 | 71 | | 63 | 75 | 73 | | | 70.2 |
| 7 | 70 | 51 | 69 | 58 | | | | 50 | 59.6 |
| 8 | 70 | 59 | | | 54 | 60 | | 40* | 56.6 |
| 9 | 82 | 87 | | | 90 | 87 | | 81 | 85.4 |
| 10 | 72 | 34* | 72 | | 50 | | | 54 | 56.4 |
| 11 | 72 | 65 | 80 | | 74 | 69 | | | 72.0 |
| 12 | 68 | 38* | 78 | | 50 | 50 | | | 56.8 |
| 13 | 78 | 93 | | | 91 | 93 | | 95 | 90.0 |
| 14 | 79 | 73 | 83 | 83 | | | 83 | | 80.2 |
| ** 15 | 58 | 71 | | | 59 | 58 | | | 61.5 |
| ** 16 | 78 | 87 | | | 92 | 84 | | | 68.2 |
| ** 17 | 55 | 83 | | | 76 | 72 | | | 57.2 |
| 18 | 65 | 54 | | | 50 | | 61 | 68 | 59.6 |
| 19 | 72 | 72 | 76 | | 80 | 80 | | | 76.0 |
| 20 | 80 | 57 | 85 | | 67 | | 67 | | 71.2 |
| 21 | 62 | 50 | 53 | 54 | | | 56 | | 55.0 |
| 22 | 69 | 80 | 75 | | 79 | 83 | | | 77.2 |
| 23 | 69 | 67 | 80 | | | | 74 | | 75.6 |
| 24 | 72 | 87 | | 75 | 76 | | | 74 | 76.8 |
| 25 | 77 | 69 | | | 61 | | 80 | 52 | 67.8 |
| 26 | 65 | 61 | | | 70 | 73 | | 58 | 65.4 |
| 27 | 54 | 69 | | | 71 | 82 | | | 69.0 |
| 28 | 55 | 67 | | | 53 | 59 | | 50 | 56.4 |
| 29 | 66 | 86 | | | 86 | 84 | 74 | | 79.2 |
| 30 | 72 | 56 | | | 59 | | 73 | 67 | 65.4 |

| | E | M | H | G | C | P | B | F | Average |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 67 | 54 | 75 | | 55 | 68 | | | 63.8 |
| 32 | 67 | 70 | | | 69 | 73 | | 71 | 70.0 |
| 33 | 57 | 73 | | 58 | | 70 | | | 63.5 |
| 34 | 75 | 79 | | 70 | | | 77 | 77 | 75.6 |
| 35 | 80 | 57 | 82 | | 67 | | 74 | | 72.0 |
| 36 | 58 | 58 | 82 | | | 64 | | | 65.5 |
| 37 | 84 | 65 | | | 74 | 69 | | 76 | 73.6 |
| 38 | 58 | 51 | | | 56 | 50 | | | 54.6 |

* Wrote the School Supplemental August 1970.

** Students with a private Music Option.

Legend:

E - English
M - Mathematics
H - History
G - Geography
C - Chemistry
P - Physics
B - Biology
F - French