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Morris H. McMichael

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A COMPARISON OF STUDENT ACHIEVEMENT, AS MEASURED BY MARKS RECEIVED, IN RESIDENCE AND EXTENSION COURSES AT THE UNIVERSITY OF NEW MEXICO

By

Morris H. McMichael

A Thesis

Presented in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts in Education

University of New Mexico

1950

This thesis, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of the University of New Mexico in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

E. H. Castetter

DEAN

May 11, 1950

DATE

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CHAPTER I

NATURE OF THE INVESTIGATION

Interruptions and cessation of planned programs have been perennial problems in the work of students from the earliest days of collegiate education. Many unforeseen difficulties account for these problems. For various reasons, many students have found it necessary to withdraw from college prior to graduation. The chances of return have been very slight for many of them. Others who have obtained college degrees have discovered later the need for additional training but have been unable to leave their employment to attend college in residence.

The National University Extension Association, of which the University of New Mexico is a member, was established in 1915 in order to offer service to people in like situations. In 1924 extension classes were established by this university and correspondence courses in 1928. These courses allowed many people who were unable to attend the university campus to pursue their educational programs. Since 1928 approximately sixty-five hundred people have availed themselves of this service from the University of New Mexico alone.

When something new or different is initiated people frequently hold conflicting ideas regarding the outcome. Controversy over the establishment of correspondence

courses and extension classes was a typical example of this outcome. Differences of opinion arose regarding the comparative quality of academic performance of students enrolled in residence and those in extension. However, no objective study has yet been made at the University of New Mexico comparing the academic performance of students in extension with that made by resident students, hence those differences of opinion have not been reconciled. In order to shed some light on the issue, this problem has been undertaken.

I. THE PROBLEM

Statement of the problem. The purpose of this study is to compare the academic achievement as measured by grade-point averages of (1) students in residence with their achievement in correspondence courses; (2) students in residence with their achievement in extension classes; (3) students in extension classes with their achievement in correspondence courses; and (4) to compare general student achievement as measured by grade-point averages of the same students in all three conditions of enrollment namely, residence, extension classes, and correspondence courses.

It is not the intent of this study to show or attempt to prove superiority of either extension or resident credit as measured by grade-point average. It is only to compare the relative achievement made by the same students when

enrolled in residence and extension as measured by the marks received.

Delimitation of the problem. This study is limited to data compiled from records of students who completed either one year or one semester and two summer sessions in residence at the University of New Mexico. Furthermore, only such records of students which indicated at least two correspondence and two extension class courses through extension were included.

Importance of the problem. In the opinion of some educators the academic performance of students in extension work is inferior to work done by them in residence. Others believe, however, that the achievement of students in extension classes is as good as, and sometimes better than, their achievement in residence.

The problem involved seems to be an important one. Because the amount of extension credit which can be applied toward a college degree is limited, this study should provide evidence for more intelligent determination of bases for such limitation.

Furthermore, concerning the matter of maintaining present practices and procedures or attempts to improve such practices and procedures in the University's Extension Division, results of an investigation like this should be of considerable value. There seems reason to believe also

that the needs and rights of college students in extension and correspondence work should be considered. It would be difficult to justify a program of course work for such persons that was definitely inferior to that done in residence. This in turn implies a need for, first, making every effort to ascertain the relative quality of the work offered under the various conditions of enrollment, and second, for applying the information obtained directly to the problem of offering a superior quality of work in each of these conditions of enrollment. Thus, consideration of the needs and rights of students working in correspondence courses and extension classes seems to give further evidence of the importance of this problem.

II. DEFINITIONS OF TERMS USED

Extension courses. In this study the term extension courses includes both extension classes and correspondence courses.

Extension classes. During the academic school year classes are conducted by university-approved personnel in certain communities, towns, and cities of the state. These are called extension classes and are attended by people wishing to further their education who cannot attend the University in residence. In other words, the teacher goes to the students rather than having them come to the teacher.

Only those courses listed in the general university catalog are offered in this manner. The instruction should be as thorough as that given in residence. Credits earned in this manner may be applied toward an undergraduate or graduate degree to the extent of forty semester hours and six semester hours respectively.

Correspondence courses. At any time during the year an individual may further his education by enrolling in university courses by mail. Such courses are planned and conducted by qualified university professors who teach the same courses to resident students. The correspondence course lessons are mailed to the student along with the textbooks and instructions for each lesson. The student then completes the lessons and returns them by mail. His marks are based on achievement resulting from his own initiative. Credits received in this manner may be applied toward an undergraduate degree to the extent of thirty semester hours. These courses are administered entirely by correspondence and are rightfully termed correspondence courses.

Resident student. Any student who has enrolled at the University of New Mexico for classes on the campus and has completed either one year of work or one semester, plus two summer sessions, is classified in this study as a resident student.

Grade-point average. In this study it was necessary to use a common means of comparison for the three different methods of obtaining academic credits, namely, residence, extension class, and correspondence course. Each course allows a stated number of semester hours toward a degree and, in addition, grade points are given in accordance with the marks achieved. The mark of A will give the student three points for each hour of credit, B will give two points, C will give one, and D carries no grade points.

To arrive at the grade-point average the total grade points are divided by the total number of credits earned. At the University of New Mexico a student must have at least one grade point for each credit counting toward graduation in order to receive a degree.

III. SOURCES OF THE DATA

Data for this study were compiled from the records on file in the offices of the University Registrar and the Director of Extension.

IV. METHODS OF PROCEDURE

This study is based on a total of 380 records of students selected from fifteen thousand transcripts originally examined. The 380 cases represented were divided into three categories. The first division contained

eighty cases based on records of students who had the necessary residence work and who, in addition, had completed at least two extension classes and two correspondence courses. The second division contained 130 cases based on records of students who had completed the necessary residence work and at least two extension classes. The final division comprised 170 cases. These were based on records of students who had completed the necessary residence work and at least two correspondence courses.

The cases were tabulated on a master sheet to show credits and grade points earned for residence, extension classes, and correspondence courses. In order to make further comparisons from which additional information could be gathered, the data were distributed on the basis of graduates, undergraduates, and sex. From the credits and grade points earned, grade-point averages were computed rather than using the letter grades, A, B, C, D, I, and F for each student.

Coefficients of correlation were obtained for the grade-point averages attained by each student. The correlation was between (1) grade-point averages in residence and in correspondence courses; (2) grade-point averages in residence and extension classes; and (3) grade-point averages in extension classes and in correspondence courses.

It was deemed necessary to procure additional in-

formation from which a further comparison could be made of marks earned by students in the three conditions of enrollment. There were eighty students who had obtained credits by all three methods. Graphs were compiled for these students to see how their marks compared with those attained by students in residence and correspondence, and also with grades received by students in residence and extension class.

It also seemed feasible to obtain as much other information as possible that would help to clarify the problem in question. Grade-point averages attained in residence by all pupils, men and women, on the undergraduate level were compared with those obtained on the graduate level. Comparisons were also made of records of men and women in the distribution. First, the residence grade-point averages of all men were compared with the residence grade-point averages of all women. Next, residence grade-point averages of undergraduate men were compared to residence grade-point averages of graduate men. Also, a comparison was made of the residence grade-point averages of undergraduate women and graduate women.

The same types of comparisons were made of grade-point averages attained in extension classes and also in correspondence courses. From these statistical data, observations were made and conclusions drawn.

V. ORGANIZATION OF THE REMAINDER OF THE STUDY

A previous study of this kind had never been made at the University of New Mexico. Several other colleges and universities throughout the United States, however, have compiled somewhat similar information for their own institutions. Chapter II will deal with a discussion of the findings of other universities on the subject.

Presentation of the statistical analysis derived from student transcripts at the University of New Mexico will compose Chapter III.

In Chapter IV, the conclusions and recommendations developed from this study will be summarized.

CHAPTER II

REVIEW OF RELATED LITERATURE

The earliest establishment of correspondence and extension class work was in 1909. Since that time colleges and universities which offer credit by extension courses have carried on a variety of studies in an attempt to compare achievement in correspondence and extension class with the same student's achievement in residence. Most of the related studies have been undertaken by the Extension Divisions of various institutions throughout the United States. These studies will be reviewed here. In addition, the findings from an unpublished Master's thesis from the University of New Mexico will be presented.

Study by R. E. Crump.[1] The plan of investigation that Crump decided upon was to select certain subjects which were taught by the same instructor in the three methods of instruction. Each instructor evaluated his students three different times during the term. A test was given at the beginning of each course. At a specified interval during the term a second test was made and a final examination was administered at the conclusion of the course.

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[1] Robert Edward Crump, Correspondence and Class-Extension Work in Oklahoma (Southeastern State Teachers College Contributions to Education, No. 1. Durant, Oklahoma; Southeastern State Teachers College, 1928), pp. 46-67.

Initial intelligence of the students was tested by the Otis Self-Administering Intelligence Tests -- Higher Form A. These tests were selected because of their reliability, ease of administration, and ease of scoring. Crump took into consideration the fact that professors may vary from term to term in methods of instruction and this, in turn, may affect a student's concomitant learnings. He obtained cooperation from the instructors to insure consistency throughout the term.

The three methods of conducting classes were set up in seven different courses on the campuses of different colleges in Oklahoma. The total number of students for each course was divided into three groups, each group taught by a different method but by the same instructor. Each student was required to record actual time needed for the preparation of lessons. When the courses were completed students were equated by the McCall method. Crump concluded that class extension and correspondence work was on a par with residence instruction.

The study by Crump, although excellent in all respects, is not entirely parallel to the conditions of this writer's study. Crump had a controlled situation. All of his students were on the campus. They were divided into three groups, each receiving instruction by a different method, namely, residence, correspondence, and extension

class. The marks used by this writer for his study were earned by students taking correspondence courses from the University of New Mexico, regardless of where they happened to reside and marks earned by students in extension classes held in any section of the State where there was enough interest to warrant holding a class. Ages, abilities, and job experience background of such students are by no means the same.

Study by Clem Oren Thompson.[2] In his work, The Extension Program of the University of Chicago, Thompson made a detailed study of the abilities of extension students. He did not obtain any objective measures of the abilities of extension students. They were not required to take any of the intelligence examinations. Thompson presented two measures, however, that could be used for comparison. The first was between marks received by students in extension and students in residence. The second comparison was the relative homogeneity of marks earned by groups of students enrolled in extension and residence. In presenting the conclusions, Thompson stated:

> When correspondence study students come to the Quadrangles to work the difference between the mean quality of their undergraduate work and of all un-

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[2] Clem Oren Thompson, The Extension Program of the University of Chicago (Chicago: University of Chicago Press, 1933), pp. 123-33.

dergraduate work on the Quadrangles is .41 ± .015 grade points in their favor; when extension class study students come to the Quadrangles and work the difference between the means of their undergraduate work and all undergraduate work on the Quadrangles is .52 ± .02 in their favor.[3]

Study by Alfred Lawrence Hall-Quest.[4] In his book, The University Afield, Hall-Quest stated that instructors for extension teaching should, beyond the shadow of a doubt, be the best material the University can afford. Its professors are sent into the smallest communities where libraries are few and instruction facilities meager. It is then up to the teacher "to put his subject across" in the best possible way under existing conditions.

He also stated that many Universities are jealous of their resident enrollments and do not allot as large a sum of money for expansion of extension divisions as could be used in most cases. In such institutions the enrollment is held down more by the unavailability of courses for extension study than by the incapability of students studying by extension.

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[3] Ibid., p. 51.

[4] Alfred Lawrence Hall-Quest, The University Afield (New York: The Macmillan Company, 1926), pp. 166-84.

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[3] Ibid., p. 51.

[4] Alfred Lawrence Hall-Quest, The University Afield (New York: The Macmillan Company, 1926), pp. 166-84.

Study by Herbert Sorenson.[5] In the paper, "The Abilities of Extension Students," presented by Sorenson in May, 1933, to the National University Extension Association, he declared the typical extension student to be as well qualified in scholastic ability and better qualified from a maturity standpoint and job experience background than resident students. He also stated:

> Extension students generally achieve more in proportion to their measured aptitudes than do residence students.[6]

Sorenson said that if this fact is expressed in the terminology of educational psychology, one could say that the extension students have higher accomplishment quotients than resident students. These relatively higher achievements are due to the fact that study and learning are more real and vivid to those students who are mature. Experience gives a vitality to classroom and laboratory work that young, inexperienced people lack.

Second Study by Herbert Sorenson.[7] In the study

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[5] Herbert Sorenson, "The Abilities of Extension Students," Proceedings of the Eighteenth Annual Convention of the National University Extension Association, Vol. 16, 1933, pp. 35-40.

[6] Ibid., p. 38.

[7] Herbert Sorenson, Adult Abilities in Extension Classes (Minneapolis, Minnesota: The University of Minnesota Press, 1933), pp. 29-64.

that Sorenson made on Adult Abilities in Extension Classes, he found that the abilities of women extension students in the Minnesota Reading Test and Minnesota College Aptitude Test were markedly higher than those of men extension students, except at the upper extreme. In the same tests extension students, including both men and women, had more ability than college freshmen, slightly less ability than juniors and seniors in the Minnesota College Aptitude Test, and slightly higher ability than juniors and seniors in the Minnesota Reading Test.

Sorenson also made the statement that when one considers the theory that mental growth normally ceases somewhere between the ages of thirteen and eighteen, any additional abilities attained by the individual must accrue from school or job experience. This would tend to suggest that the average extension student would have better general college ability than most college freshmen.

Study by Arthur J. Klein.[8] In the article, "Correspondence Study in Universities and Colleges," Klein reported some of the facts concerning the extent and use of the correspondence method of instruction by reputable institutions, and to show how these institutions carry on

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[8] Arthur J. Klein, Correspondence Study in Universities and Colleges (Bulletin of the United States Office of Education, 1920, No. 10. Washington, D. C.: United States Government Printing Office, 1920), pp. 1-33.

the work in such a way that its educational value can not be questioned. In summarizing statements from seventy-three institutions contributing to the study, Klein stated:

> It is common testimony of institutions that students in residence who have taken work by correspondence ordinarily rank in the upper fourth of their classes.[9]

He also stated that the results of questionnaires distributed by the different colleges and universities showed that students then enrolled in residence thought correspondence courses required more rigid discipline to prepare lessons before turning them in. The students indicated that they could let residence work "slide along" until time for examinations and then "cram."

Klein believed that this would tend to explain why the largest percentage of students who complete correspondence study are a select group in that they do not drop out but put more time on lesson preparation and have the perseverance to finish the course.

Study by Russell M. Grumman.[10] In the book, University Extension in Action, Grumman stated that at Chapel

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[9] Ibid., p. 28.

[10] Russell M. Grumman, University Extension in Action (Chapel Hill, North Carolina: The University of North Carolina Press, 1947), pp. 25-48.

Hill, North Carolina, the best instructors are encouraged to carry part of the load of correspondence and extension subjects. It was felt from the very beginning of extension work that good instructors were necessary to keep instruction on as high a level as possible. Grumman's only mention of extension students' abilities was that a good many of them came to Chapel Hill to complete work for their degree and experienced no difficulty in doing so.

Study by J. O. Marberry.[11] An entirely different approach to the same problem was presented by Marberry in his study, Extension Teaching in the University of Texas as Viewed by the Student. Students who had received instruction in both residence and extension were given questionnaires to complete. The questionnaires asked for comparisons between courses taught in residence and similar courses taught by extension. From the tabulated answers Marberry concluded that higher ratings were given in extension teaching in more than one-third of the cases reported and about the same as residence instruction in more than one-half of the total. The remaining number, approximately one-sixth of the total, said residence instruction was superior to that given by extension.

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[11] J. O. Marberry, Extension Teaching in the University of Texas as Viewed by the Student (University of Texas Bulletin, No. 2910. Austin, Texas: The University of Texas, 1929), pp. 56-65.

Marberry commented that probably these were students who had received low marks in extension work.

Study by William Henry Zeigel.[12] In Zeigel's work, The Relation of Extra-Mural Study to Residence Enrollment and Scholastic Standing, he found from a study of 4141 enrollments for the years 1919 to 1923 inclusive in residence and extra-mural (correspondence and class extension) classes that residence grades are a much better index of extra-mural grades than extra-mural grades are of residence grades. He also found that when grades in all three types of instruction were compared, they ranged in every instance as follows: (1) residence marks were lowest; (2) extension marks were grouped around the middle point; and (3) correspondence marks were highest.

Another interesting fact discovered by Zeigel was that students who had both residence and extension study, or residence and correspondence study, always made higher grades in residence than did students with residence study alone. Conversely, students' grades in extra-mural studies were higher when residence work was also being taken than when extra-mural work was taken alone.

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[12] William Henry Zeigel, The Relation of Extra-Mural Study to Residence Enrollment and Scholastic Standing (State Teachers College Bulletin, Education Series No. 2. Vol. 24, Nos. 8-9. Kirksville, Missouri: Journal Printing Company, 1924), pp. 44-226.

Study by Walton S. Bittner and Hervey F. Mallory.[13] In the book, University Teaching by Mail, Bittner and Mallory made a study of eight institutions, all members of the National University Extension Association. Their conclusions were that correspondence students frequently comprise a select group with superior persistence and perhaps superior ability or that they have gained superior habits of study at home or at school. Of the hundreds of students who enroll for correspondence work to obtain university credit, the average is not more than three correspondence courses, or an average total of nine credits for all who graduate.

This fact should not affect the accredited ratings of any university or college. Students who find the work by correspondence more difficult than they expected, drop out. Those who complete courses are of the group with superior persistence and ability. Students working for a degree usually present only a small number of credits earned by correspondence to apply toward graduation. Institutions should never fear that such students' work is below average, for it is usually above.

Bittner and Mallory also stated that correspondence study is not advocated as a substitute for residence study

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[13] Walton S. Bittner and Hervey F. Mallory, University Teaching by Mail (New York: The Macmillan Company 1933), pp. 113-57.

but as a supplement to it. If anyone completes, by correspondence, as much as one third of the semester hours required for graduation, he should be admired for the perseverence shown. Such people also tend to raise the academic standards.

When speaking of ratings of students taking work by residence as compared to home study, Bittner and Mallory stated:

> The majority of students who undertake study at home are earnest and ambitious and their records show the expected results. The graduates of eight institutions in 1928 and 1929, who earned a part of their credits by correspondence study, won more honors than those who had done all their work in residence.[14]

It was also suggested by Bittner and Mallory that an instructor of correspondence courses must possess a very different combination of qualities than the instructor for residence work. An instructor for correspondence study must have resourceful imagination to meet situations arising concerning the individual student who must necessarily depend upon written communication for his assignments and instructions. The instructor must be one of the best the institution can offer.

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[14] Ibid., p. 23.

Study by W. Barnie Caton.[15] In the thesis, "A Study of the Extension Division of the University of New Mexico, with Emphasis on the Period 1928-1938," Caton concluded that the quality of work performed by both extension class and correspondence were on a high level. The grades earned by correspondence students were slightly lower than grades earned by extension class students. Both, however, were higher than the normal curve.

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[15] W. Barnie Caton, "A Study of the Extension Division of the University of New Mexico, with Emphasis on the Period 1928-1938," (unpublished Master's thesis, The University of New Mexico, Albuquerque, 1938), p. 99.

CHAPTER III

PRESENTATION OF STATISTICAL ANALYSIS

One method of evaluating student achievement is measurement of the scholastic standing the individual attains. Under scholastic standing are included both rank in marks received and advancement in terms of semester hours of credit. It is admitted that the ranking of students, as revealed by marks, varies widely from professor to professor, subject to subject, and from semester to semester. There are also many methods of analyzing statistical data, the selection of which is dependent upon the purpose for which it is to be used. The writer has elected to use graphs, the mean, the standard deviation, correlation, and critical ratio as methods of studying the groups to see what differences, if any, exist in marks attained by the same students in residence, correspondence, and extension class. The presentation which follows will include relative facts as measured by grade-point averages and the discussion of certain assumptions which could be made about these relationships.

To help clarify the comparisons for the reader all discussion, figures, and tables will be consolidated into three groups, A, B, and C. Group A will be comprised of (1) all students, both men and women and graduates and

undergraduates, who have received marks in residence, correspondence, and extension class study; (2) all men, both graduates and undergraduates, who have received marks by the three methods of instruction; and (3) all women, both graduates and undergraduates, who have received marks by the three types of study.

Group B is made up of (1) all graduates, both men and women; (2) graduate men; and (3) graduate women. All three subgroups are divided according to the method of instruction from which their marks were earned.

Group C is made up of (1) all undergraduates, both men and women; (2) undergraduate men; and (3) undergraduate women. With Group C, as in Groups A and B, the subgroups are further divided according to the three different methods of instruction.

Analysis of Group A. The first comparison will be between grade-point averages earned in residence and by correspondence. Figure 1 portrays graphically marks earned by 250 students who completed work by both methods of instruction. It will be noted that the two curves are markedly different. The curve representing the residence grade-point averages is fairly regular. On the other hand, the correspondence graph-line is very irregular, with the two distinct peaks forming a bi-modal curve. It seems to be the procedure for instructors to evaluate students on

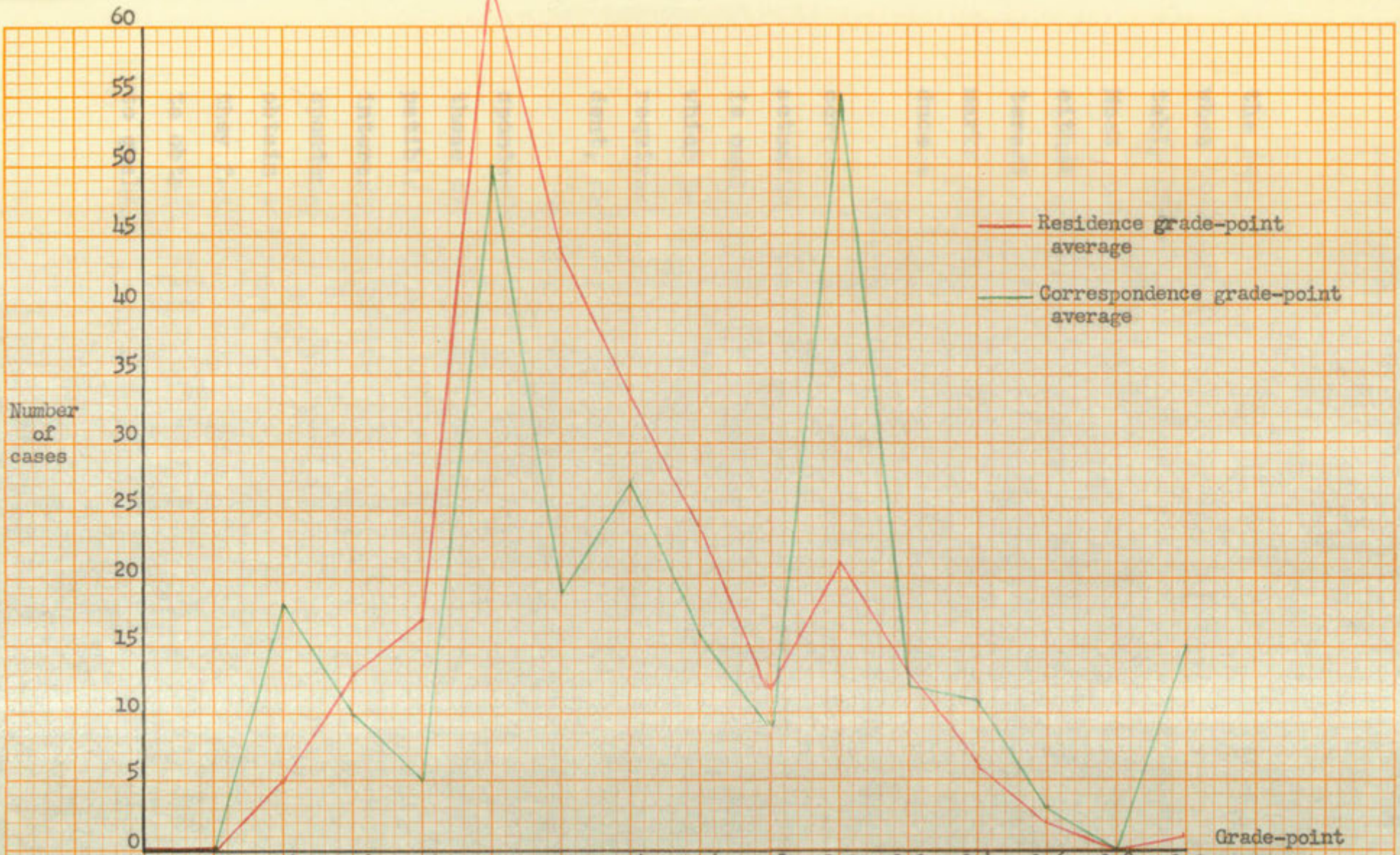
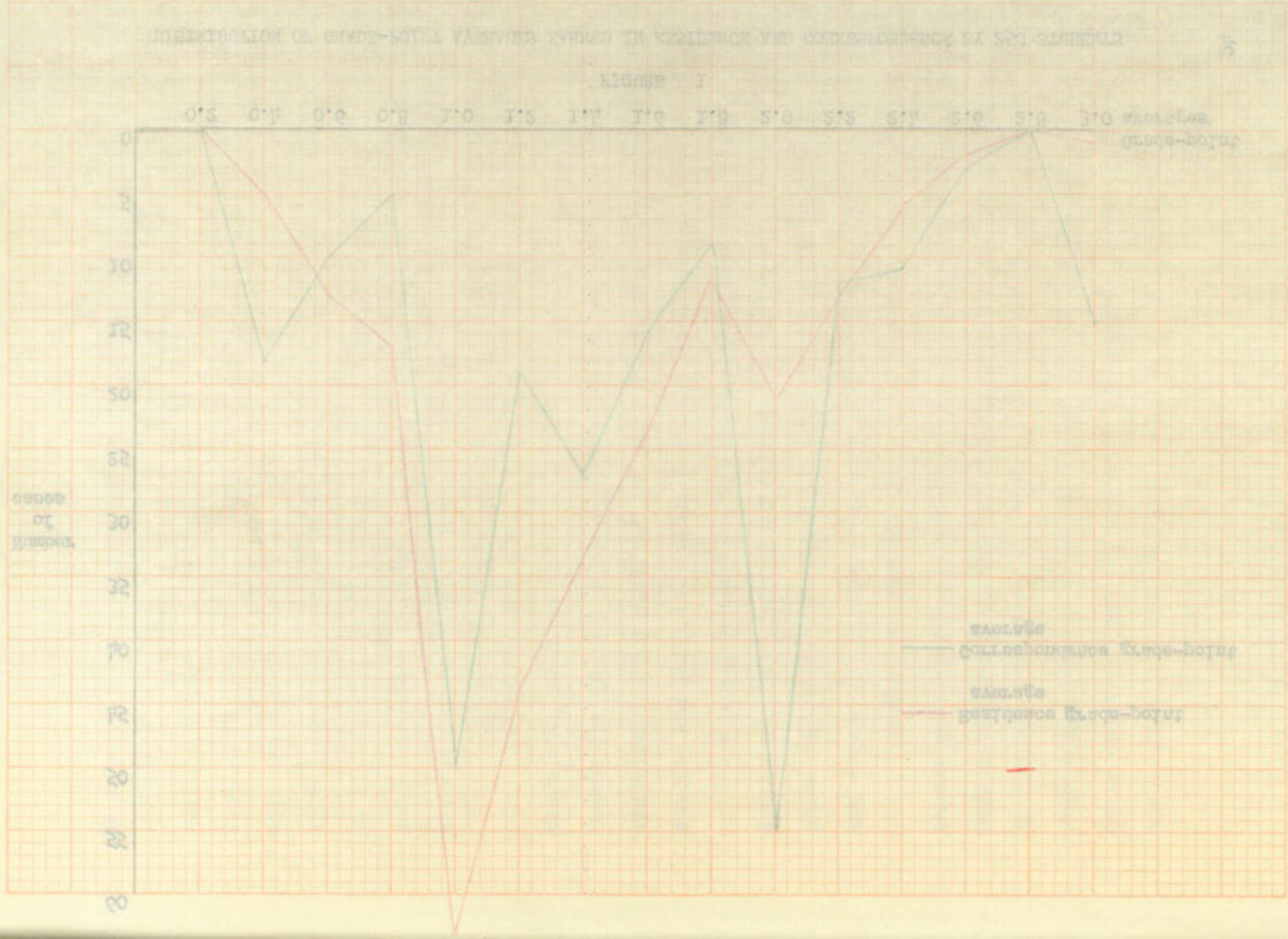


FIGURE 1

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND CORRESPONDENCE BY 250 STUDENTS



the basis of A's, B's, C's, D's, or F's and therefore, when translated into grade points, the marks given inevitably fall into the 3.0, 2.0, 1.0, and 0.0 groupings. Most marks which students attain tend to congregate at either the 1.0 or 2.0 categories depending upon the interest in the subject, capabilities of the student, and marks given by the instructor, all of which tends to produce a bi-modal curve.

It is very likely that some students who enroll in correspondence courses complete the work because they are actually interested. In residence, a set course of study is outlined for each student, varying with the college in which he is enrolled. In the latter case many courses are required which are of no particular interest to the student, and, therefore, his marks may suffer accordingly.

There are two types of people who enroll in correspondence courses. Students in the first group select those courses which are to their liking and which are compatible with their established vocational or avocational interests. Students in the second group apply for correspondence courses for several reasons. Some may wish to obtain courses which count toward graduation but which they failed to obtain while in residence. Others may wish to obtain a teacher's certificate and need special courses to qualify. Still others may need courses to secure a

particular position. Changes in the industrial world require others to review a prescribed list of courses in order to keep pace. Students in this second group do not have the incentive to apply themselves and are probably the ones who receive the lowest marks indicated in Figure 1.

Figure 2 shows a comparison of grade-point averages earned by 210 students enrolled in both residence and extension class courses. In Figure 2, as well as in Figure 1, the residence grade-point averages follow very similar paths. The extension class graph-line shows a definite bi-modal tendency which, also, can probably be explained by the commonly practiced evaluation of students' work.

Another comparison in this group was between the grade-point averages earned by eighty students enrolled in both correspondence and extension class study. It will be seen in Figure 3 that correspondence and extension class grade-point averages follow the same lines very closely. It will be noted, however, that there are more students who received marks below the 1.6 grade-point average in correspondence than in extension class.

A second method of analysis of Group A is the use of the mean and standard deviation. It is shown in Table I that in all cases the mean is higher for correspondence and extension class grade-point averages than for residence

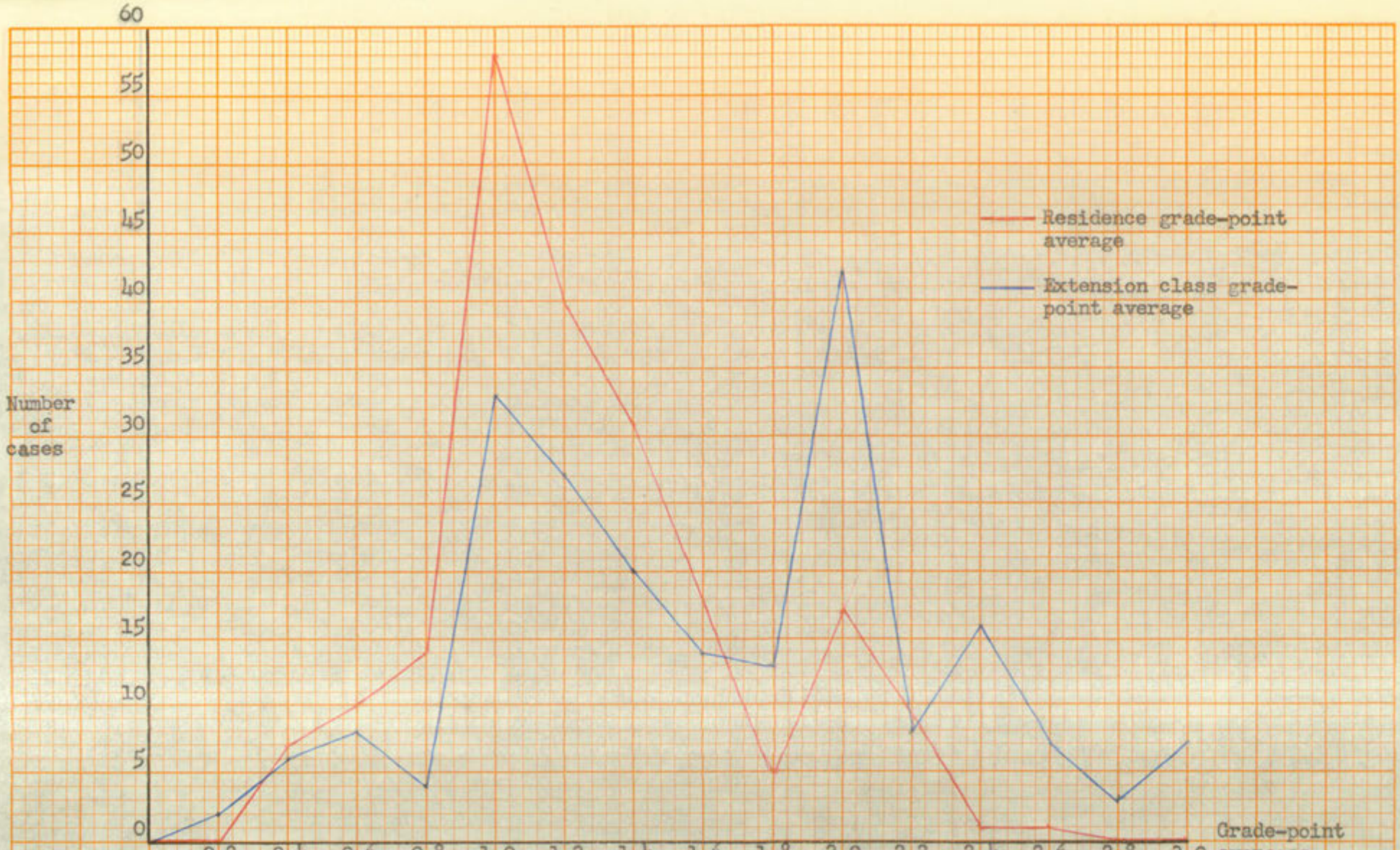


FIGURE 2

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND EXTENSION CLASS BY 210 STUDENTS

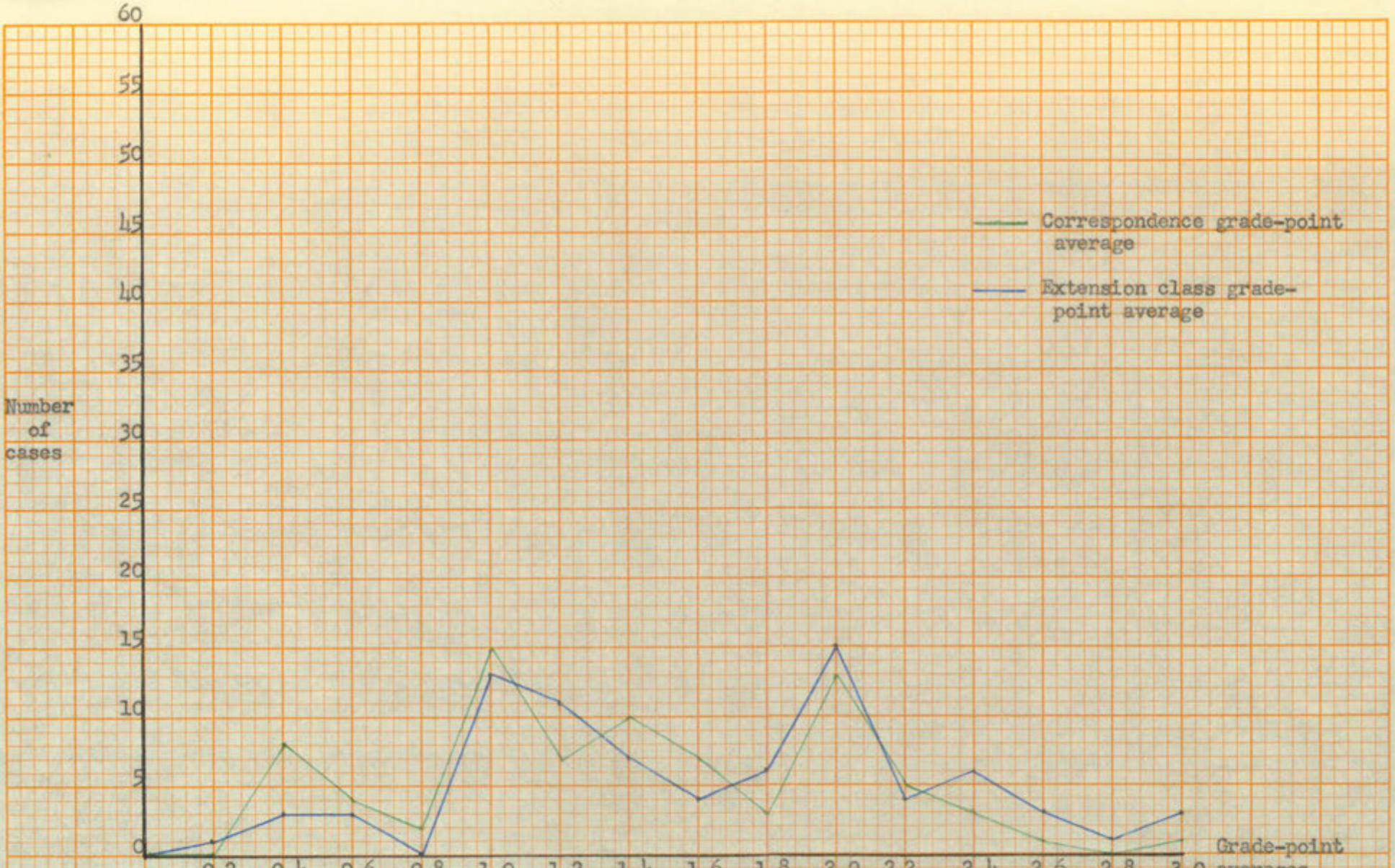


FIGURE 3

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN CORRESPONDENCE AND EXTENSION CLASS BY 80 STUDENTS

Температура воздуха, °С

Относительная влажность воздуха, %

Атмосферное давление, мм рт. ст.

Скорость ветра, м/с

Время суток

study. Table I also shows that the extension class mean for men is lower than the correspondence mean. This seems to indicate that, on the average, men do not make as high marks in extension class as they do in correspondence. The table also indicates that women make higher marks than men in all three methods of instruction.

The reader will note from Table I that the standard deviation of least magnitude is .44 and of greatest, .68. The difference of .24 is only slightly more than one-fifth of the difference between any two letter marks, and thus indicates that the range of approximately two-thirds of the middle scores is quite consistent.

TABLE I

RELATIVE ACHIEVEMENT AS MEASURED BY GRADE-POINT AVERAGES OF THE MEAN, PROBABLE ERROR OF THE MEAN, AND STANDARD DEVIATION FOR GROUP A

Group A	Mean	Probable error of the mean	Standard deviation
1. All Students			
Residence	1.41	.0160	.47
Correspondence	1.65	.0281	.66
Extension class	1.70	.0295	.64
2. Men			
Residence	1.36	.0264	.44
Correspondence	1.56	.0516	.68
Extension class	1.43	.0458	.58
3. Women			
Residence	1.46	.0204	.48
Correspondence	1.68	.0335	.65
Extension class	1.85	.0358	.62

Another method of comparison used was the coefficient of correlation (see Appendix). Table II shows a positive correlation of .688 ± .0220 between residence and correspondence grade-point averages. Garrett[1] in his table states:

> r from .00 to ± .20 denotes indifferent or negligible relationship;
> r from ± .20 to ± .40 denotes low correlation; present but slight;
> r from ± .40 to ± .70 denotes substantial or marked relationship;
> r from ± .70 to ± 1.00 denotes high to very high relation.[2]

TABLE II

CORRELATION AND PROBABLE ERROR BETWEEN RESIDENCE, CORRESPONDENCE, AND EXTENSION CLASS FOR GROUP A

Group A	Correlation	Probable error
Residence and correspondence	.688	.0220
Residence and extension class	.694	.0240
Correspondence and extension class	.715	.0373

[1] Henry E. Garrett, Statistics in Psychology and Education (second edition; New York: Longmans, Green and Company, 1946), pp. 341-358.

[2] Ibid., p. 342.

There are positive correlations of .694 ± .0240 between residence and extension class grade-point averages and .715 ± .0373 between correspondence and extension class grade-point averages. All three of the computations show marked relationship.

None of these correlations is high. They are high enough, however, to indicate that any similar group receiving high marks through one method of instruction would very likely receive high marks through either of the other two methods. Since there are many extenuating circumstances which affect marks earned by students, a positive coefficient of correlation of .6 may be regarded as quite significant.

In order to substantiate the preceding comparisons compilation of critical ratios were utilized. Good[3] explains critical ratio to be a statistical measure of the reliability of a sample, since the results for another sample may be entirely different. Good states:

> The computed value is simply a probable value. Reliability of a measure is its tendency to remain constant for various samples.[4]

Statistically, the definition of critical ratio is the computed difference between the two means divided by

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[3] Warren R. Good, An Introduction to Statistics (Ann Arbor, Michigan: The Ann Arbor Press, 1936), pp. 24-35.

[4] Ibid., p. 471.

the probable error of the difference of the two means. Unless the computed critical ratio has a magnitude of 4.0 or greater, the true difference between the measures may be zero, and is thus not significant. Significance means a true difference, or a difference greater than zero, which is not due to the element of chance in the sampling.

The critical ratio, Table III, was found to be 7.2 for the difference between the means of residence and correspondence grade-point averages, and 8.5 for the difference between the means of residence and extension class grade-point averages for all students in the study. Also, the critical ratio for women was found to be 5.8 for the difference between the means of residence and correspondence grade-point averages, and 9.5 for the difference

TABLE III

CRITICAL RATIOS FOR GROUP A

Critical ratio for the difference between two means for Group A	Residence and correspondence	Residence and extension class
All students	7.2	8.5
Men	3.4	1.3
Women	5.8	9.5

between the means of residence and extension class grade-point averages. Thus, the critical ratios of such magnitude indicate that the true difference between the means is significantly greater than zero and the computed difference is not due to chance of the sampling involved.

Table III indicates that the critical ratio for the difference between the means of residence and correspondence grade-point averages for men was 3.4. This is not large enough to insure significance, but according to the table presented by Garrett,[5] 98.9 times out of one hundred, the computed difference is not due to chance. The critical ratio for the difference between the means of residence and extension class for men was 1.3. The probabilities in this case are that eighty-one times out of one hundred the computed difference is not due to chance. Broken down still more, it could be said that there are only two chances out of ten that the results would be changed by different sampling.

Summary for Group A. To summarize briefly, comparisons for Group A, containing all students' grade-point averages, it may be said that this study indicates:

1. Correspondence grade-point averages are generally higher than those in residence.

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[5] Garrett, op. cit., p. 471.

2. Extension class grade-point averages are generally higher than those in residence.

3. Extension class grade-point averages are slightly higher than those by correspondence.

4. Grade-point averages for women are generally higher than grade-point averages for men.

Analysis of Group B. Figure 4 is a graphic comparison of marks earned by 97 graduate students who have completed work by both residence and correspondence study. Graduate students include all students who have attained at least a Bachelor of Science or a Bachelor of Arts degree. It will be noted that grade-point averages earned by students in correspondence for Group B are much higher than those earned in residence. Approximately 60 per cent of the correspondence students earned grades of B or above. On the other hand only 22 per cent of the residence grades were B or above. A possible explanation for this is that even though these particular students have a degree, they are enrolled in correspondence courses to satisfy a thirst for something new, or are interested in special courses bearing upon their vocational or avocational pursuits, which in turn has a favorable effect upon the marks earned. Correspondence courses may not be taken for graduate credit.

Figure 5 presents a comparison between residence and extension class grade-point averages earned by sixty-three graduate students. In this instance the largest grouping

2. Extension class grade-point averages are generally higher than those in residence.

3. Extension class grade-point averages are slightly higher than those by correspondence.

4. Grade-point averages for women are generally higher than grade-point averages for men.

Analysis of Group B. Figure 4 is a graphic comparison of marks earned by 77 graduate students who have completed work by both residence and correspondence study. Graduate students include all students who have attained at least a Bachelor of Science or a Bachelor of Arts degree. It will be noted that grade-point averages earned by students in correspondence for Group B are much higher than those earned in residence. Approximately 60 per cent of the correspondence students earned grades of B or above. On the other hand only 22 per cent of the residence grades were B or above. A possible explanation for this is that even though these particular students have a degree, they are enrolled in correspondence courses to satisfy a thirst for something new, or are interested in special courses bearing upon their vocational or avocational pursuits, which in turn has a favorable effect upon the marks earned. Correspondence courses may not be taken for graduate credit.

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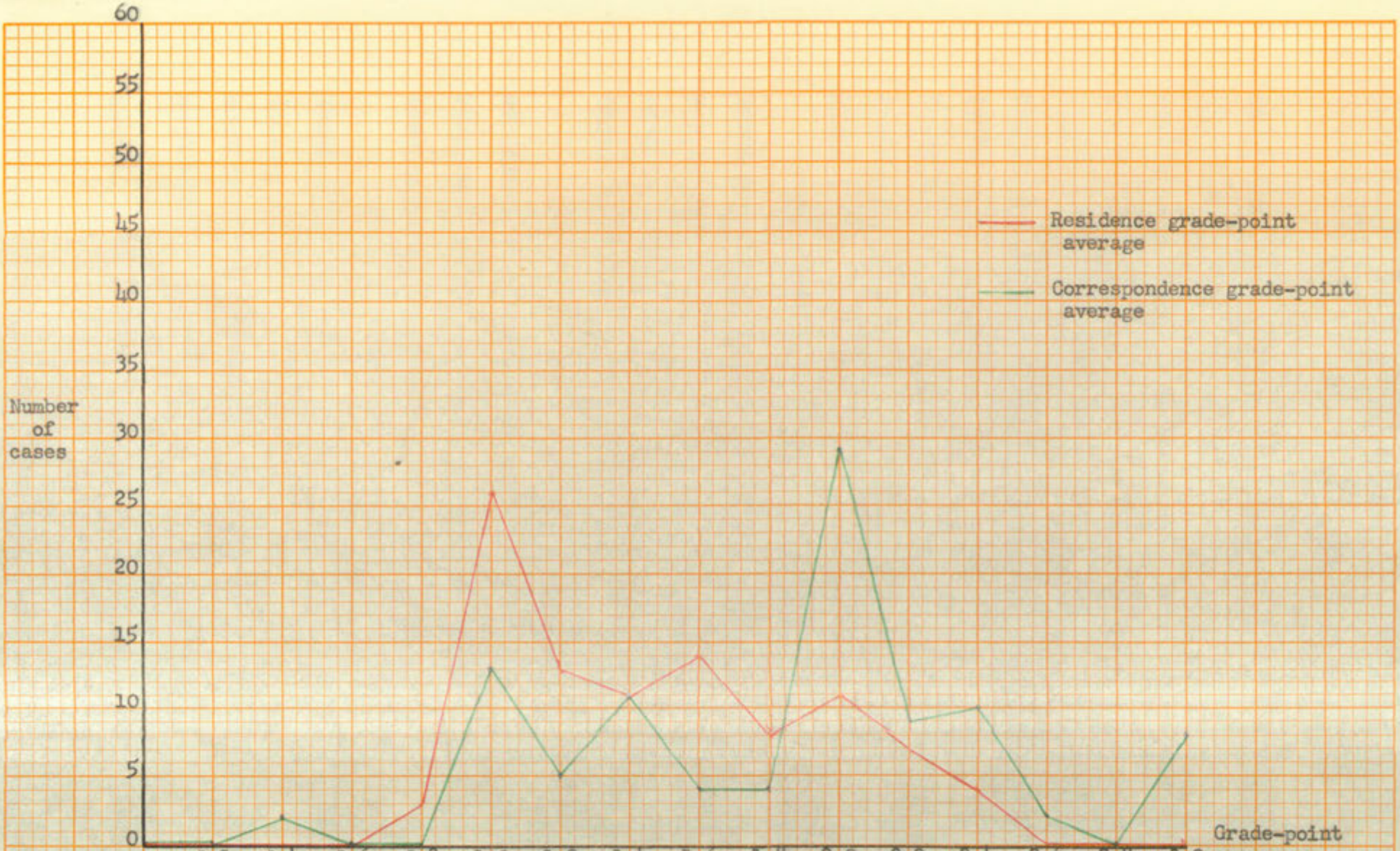

FIGURE 4

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND CORRESPONDENCE BY 97 GRADUATE STUDENTS

0
5
10
15
20
25
30
35
40
45
50
55
60
Число семей
Фактическое количество
Вероятное количество

FIGURE 5

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND EXTENSION CLASS BY 63 GRADUATE STUDENTS

of grade-point averages occurs at the 2.0 grouping, as was the case for the correspondence grade-point averages. An explanation similar to that given for the correspondence groupings in Figure 4 can probably be given for extension class. The residence grade-point average groupings for Figure 4 and 5 follow the same general patterns. The residence work is made up of courses required for graduation. Interest varies from student to student in each of these courses. It is quite likely that the assigned marks reflect this interest.

Figure 6 is a comparison of correspondence and extension class grade-point averages earned by thirty graduate students. In this case, there is very little difference in achievement as measured by marks received between these two methods of instruction.

The second method of comparison for Group B is use of the mean. Table IV indicates that grades which were received from extension courses are higher in every case than grades received in residence.

In comparing Table IV with Table I, it is clearly shown that the grade-point averages of graduates in residence, correspondence and extension classes are higher in each case than for all students taken together. Also for each method of instruction women received, on the average, better marks than men. The earned extension marks of men

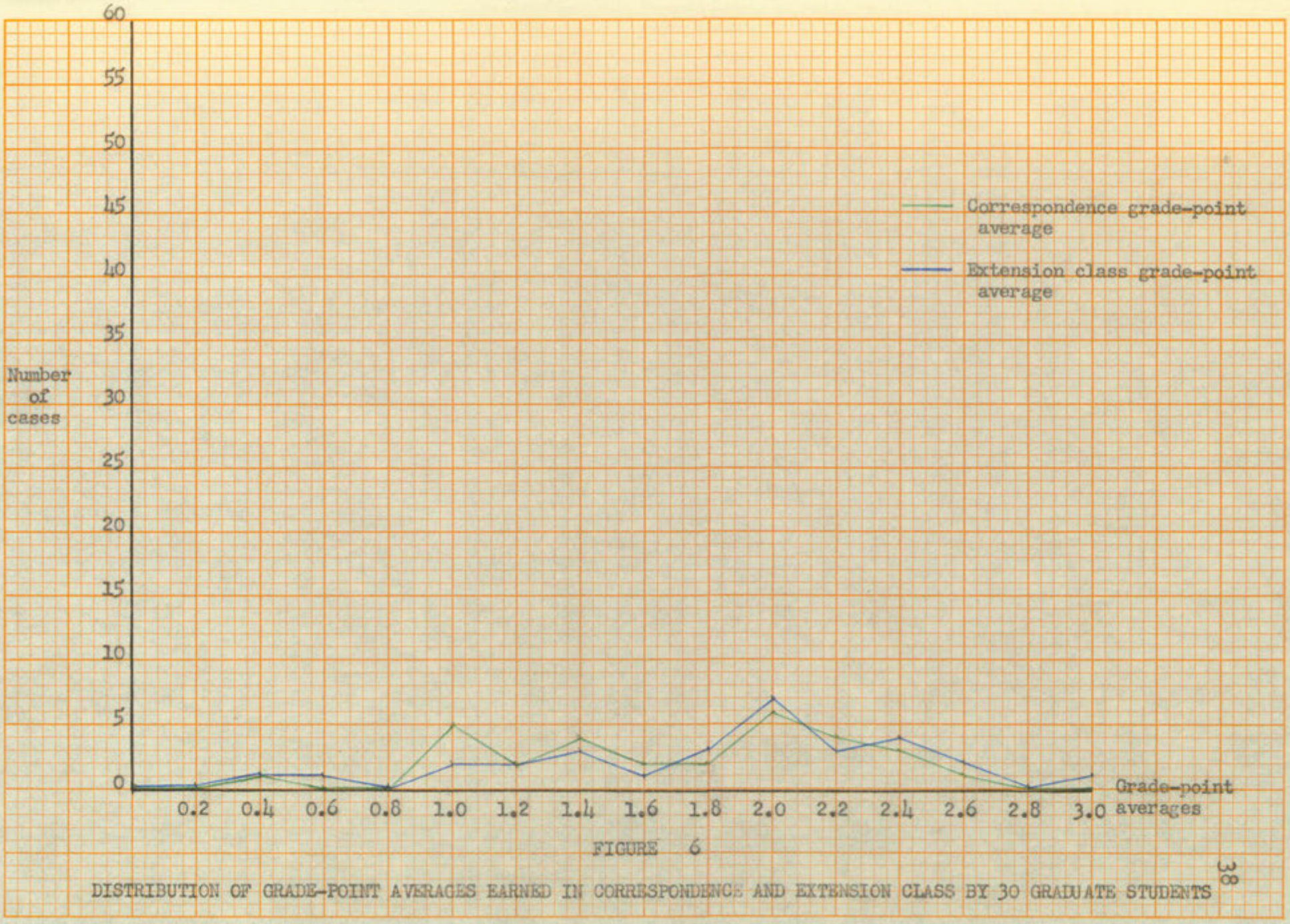

FIGURE 6

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN CORRESPONDENCE AND EXTENSION CLASS BY 30 GRADUATE STUDENTS

in Group B correspond to those of men in Group A. Men received, on the average, better marks by correspondence than through extension class.

TABLE IV

RELATIVE ACHIEVEMENT AS MEASURED BY GRADE-POINT AVERAGES OF THE MEAN, PROBABLE ERROR OF THE MEAN, AND STANDARD DEVIATION FOR GROUP B

Group B	Mean	Probable error of the mean	Standard deviation
1. All graduates			
Residence	1.54	.0254	.43
Correspondence	1.95	.0287	.56
Extension class	1.92	.0504	.59
2. Graduate men			
Residence	1.48	.0423	.42
Correspondence	1.91	.0709	.60
Extension class	1.73	.1006	.65
3. Graduate women			
Residence	1.57	.0315	.43
Correspondence	1.99	.0497	.59
Extension class	1.99	.0575	.56

Correlations (see Appendix) of grade-point averages for Group B are presented in Table V. It will be seen that there is a positive correlation between averages of each of the groups listed. The correlation between residence and extension class grade-point averages is somewhat lower than the correlations for the other two.

A coefficient of correlation of .584 $\pm$ .0568 still

denotes substantial relationship, however. The correlations for the other two sections are about the same, suggesting marked relationship.

TABLE V

CORRELATION AND PROBABLE ERROR BETWEEN RESIDENCE, CORRESPONDENCE, AND EXTENSION CLASS FOR GROUP B

Group B	Correlation	Probable error
Residence and correspondence	.644	.0400
Residence and extension class	.584	.0568
Correspondence and extension class	.648	.0541

In order to substantiate the comparisons utilized in Group B critical ratios were again computed. The results are presented in Table VI. The critical ratios for all sub-groups except for graduate men are more than 4.0. It can be said with a high degree of confidence that the obtained differences between means are significantly greater than zero and that they did not arise through chance alone. The difference between the means of residence and extension class grade-point averages for this sub-group is 2.3. This is not large enough to insure a true difference and may be due to chance sampling.

Ninety-four times out of one hundred, however, the computed difference is not due to the group sampled.

TABLE VI

CRITICAL RATIOS FOR GROUP B

Critical ratio for the difference between two means for Group B	Residence and correspondence	Residence and extension class
All graduates	8.9	6.9
Graduate men	5.2	2.3
Graduate women	7.1	6.4

Summary for Group B. In summarizing comparisons for Group B, containing the grade-point averages for all graduates, it may be said that this study indicates:

1. Correspondence grade-point averages are generally higher than those in residence.

2. Extension class grade-point averages are generally higher than those in residence.

3. Correspondence grade-point averages are slightly higher than those by extension class.

4. Grade-point averages for women are generally higher than grade-point averages for men.

Analysis of Group C. The first comparisons for Group C are portrayed graphically by Figures 7, 8, and 9. Figure 7 is the distribution of grade-point averages earned by 153 undergraduate students who have completed study by residence and correspondence. Three definite peaks appear in the correspondence grade-point graph-line. The groupings at 0.4 and 1.0 may be explained by the fact that the students in this group are all undergraduates and many may possibly have enrolled for correspondence courses in order to catch up with their class. They might have been more interested in getting the courses completed than in assimilating the material. Many students who enroll in residence do not graduate for many years and some never complete the total requirements for graduation. A large number, however, enroll for special courses and make above-average grades. The abilities of different students vary. A course that is difficult for one may be easy for another. Interest in the subject, associated learnings and above-average abilities may explain increases at the 2.0 and 3.0 groupings.

The residence graph-lines in Figures 7 and 8 follow the same general curves. The extension class groupings, Figure 8, have a pattern very similar, however, to the extension class pattern in Figure 2. They are bimodal with large numbers appearing in the 1.0 and 2.0

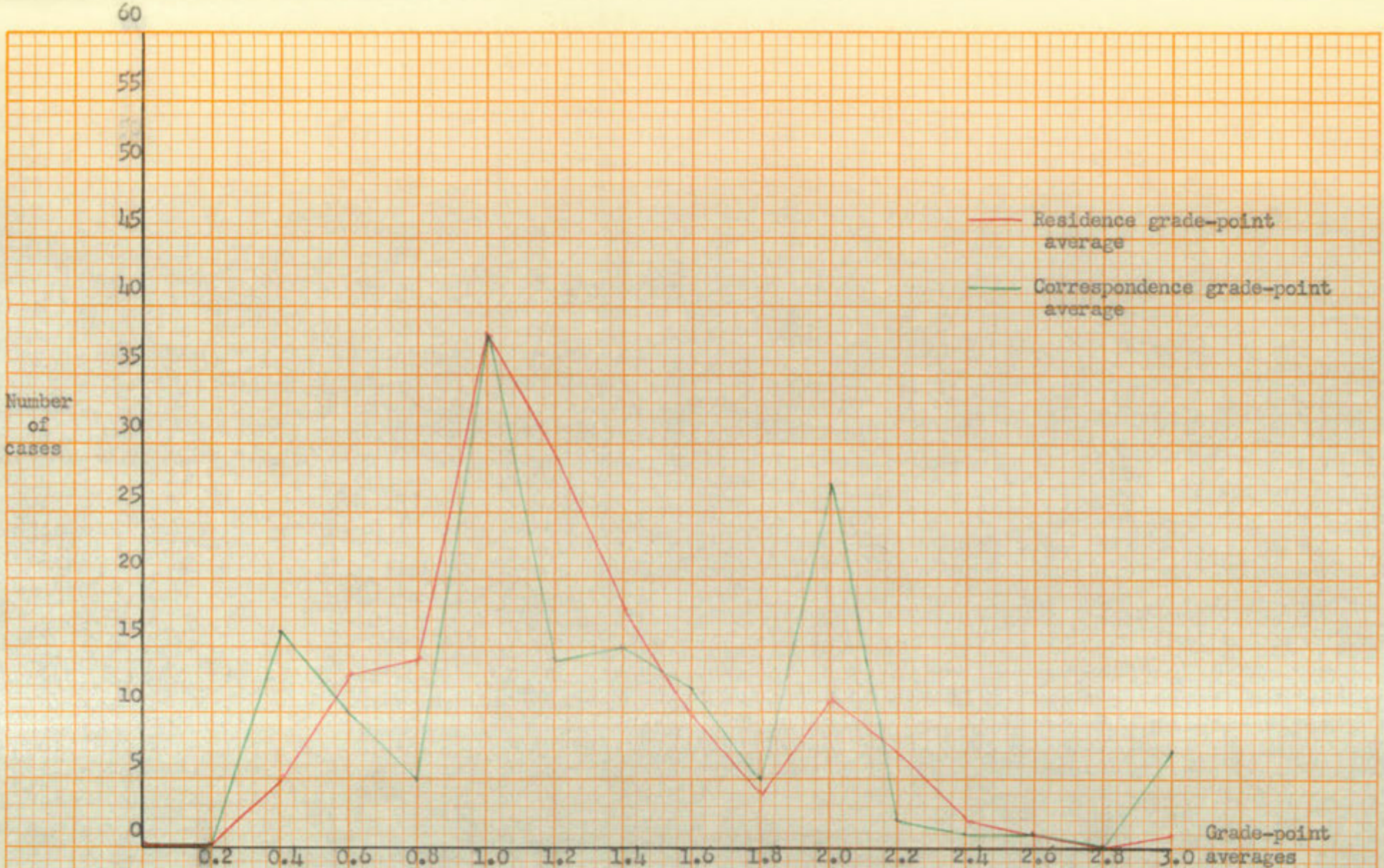

FIGURE 7

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND CORRESPONDENCE BY 153 UNDERGRADUATE STUDENTS

0,5
0,4
0,3
0,2
0,1
0
5
10
15
20
25
30
35
40
45
50

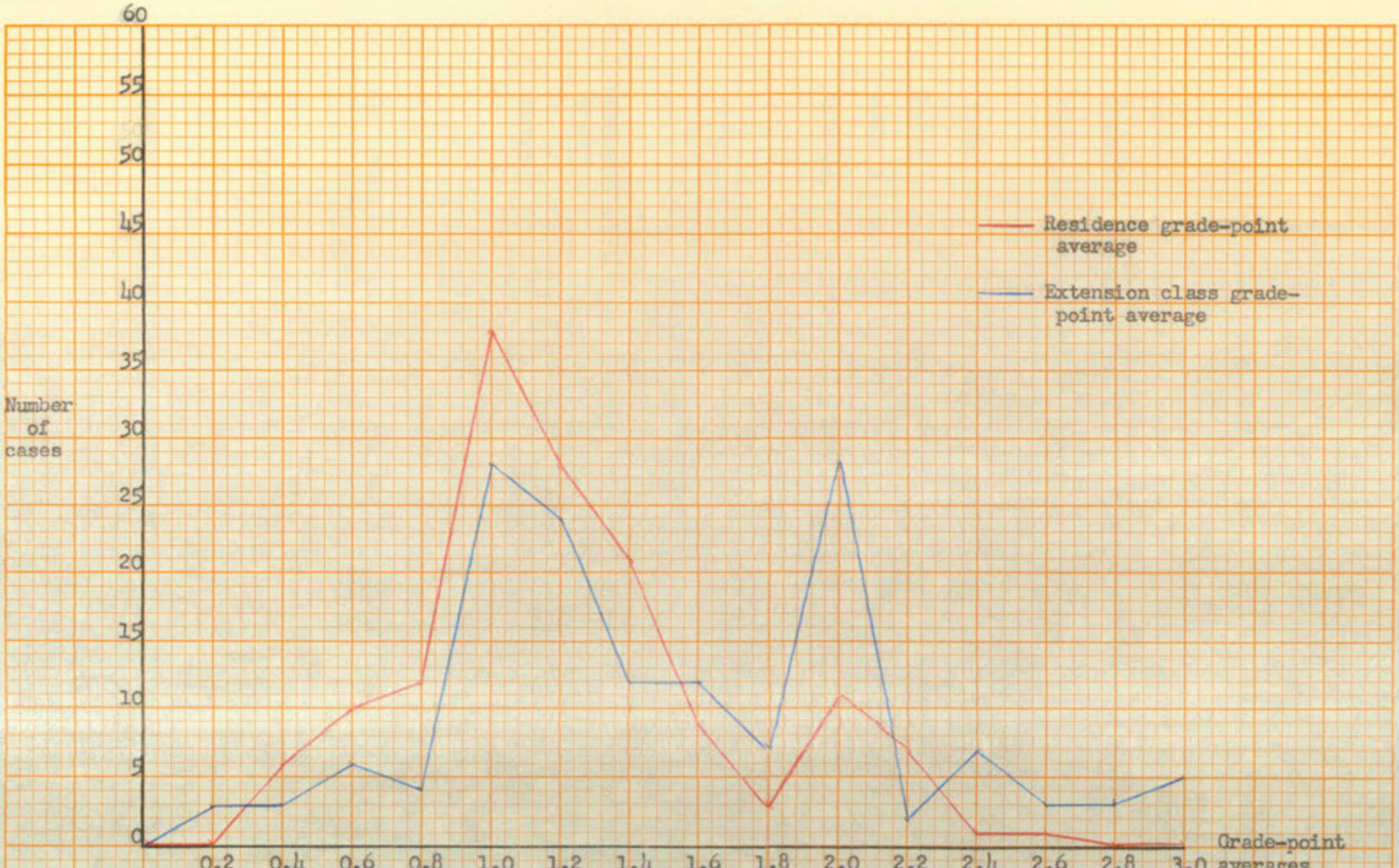

FIGURE 8

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN RESIDENCE AND EXTENSION CLASS BY 147 UNDERGRADUATE STUDENTS

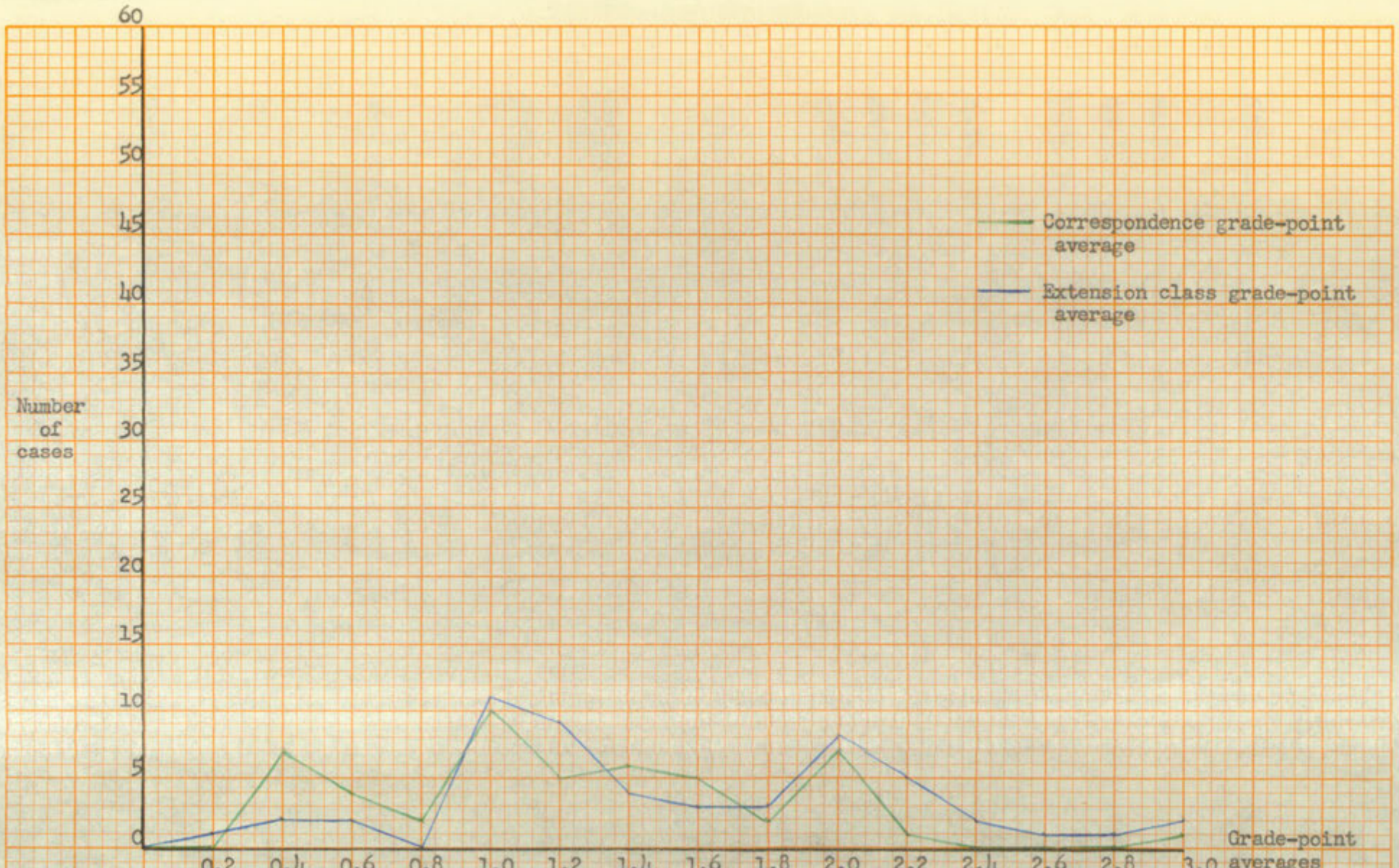

FIGURE 9

DISTRIBUTION OF GRADE-POINT AVERAGES EARNED IN CORRESPONDENCE AND EXTENSION CLASS BY 50 UNDERGRADUATE STUDENTS

Число опытов
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
11.5
12.0
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94.5
95.0
95.5
96.0
96.5
97.0
97.5
98.0
98.5
99.0
99.5
100.0

groupings.

Figure 9 reveals that undergraduates received lower marks in correspondence than by extension class. The discipline of study necessary for correspondence work may not have been adequately initiated.

The means for Group C which are shown in Table VII have a definite placing. In all sub-groups the extension class mean holds the highest grade-point average. The correspondence grade-point mean is next highest. The residence grade-point mean is the lowest in all cases.

TABLE VII

RELATIVE ACHIEVEMENT AS MEASURED BY GRADE-POINT AVERAGES OF THE MEAN, PROBABLE ERROR OF THE MEAN, AND STANDARD DEVIATION FOR GROUP C

Group C	Mean	Probable error of the mean	Standard deviation
1. All undergraduates			
Residence	1.32	.0207	.48
Correspondence	1.44	.0343	.63
Extension class	1.61	.0352	.63
2. Undergraduate men			
Residence	1.21	.0320	.43
Correspondence	1.22	.0655	.65
Extension class	1.31	.0459	.50
3. Undergraduate women			
Residence	1.40	.0262	.50
Correspondence	1.51	.0410	.63
Extension class	1.79	.0448	.64

The coefficients of correlation (see Appendix) between the grade-point averages for the three methods of instruction are presented in Table VIII.

TABLE VIII

CORRELATION AND PROBABLE ERROR BETWEEN RESIDENCE CORRESPONDENCE, AND EXTENSION CLASS FOR GROUP C

Group C	Correlation	Probable error
Residence and correspondence	.661	.0307
Residence and extension class	.532	.0395
Correspondence and extension class	.685	.0510

The reader will note that correlations between residence and correspondence grade-point averages and between correspondence and extension class grade-point averages are very similar. It will also be noted that the coefficient of correlation between the grade-point averages of residence and extension class is slightly lower than the other two but still shows marked relationship. According to these results a group of similar students receiving average marks by one method of instruction would very likely receive average marks in either of the other two methods presented in this study.

The coefficients of correlation (see Appendix) between the grade-point averages for the three methods of instruction are presented in Table VIII.

TABLE VIII

CORRELATION AND PROBABLE ERROR BETWEEN RESIDENCE CORRESPONDENCE, AND EXTENSION CLASS FOR GROUP C

Group C	Correlation	Probable error
Residence and correspondence	.851	.0307
Residence and extension class	.792	.0392
Correspondence and extension class	.685	.0510

The reader will note that correlations between residence and correspondence grade-point averages and between correspondence and extension class grade-point averages are very similar. It will also be noted that the coefficient of correlation between the grade-point average of residence and extension class is slightly lower than the other two but still shows marked relationship. According to these results a group of similar students receiving average marks by one method of instruction would very likely receive average marks in either of the other two methods presented in this study.

In order to substantiate the comparisons in Group C critical ratios were computed. The critical ratios for all undergraduates, undergraduate men, and undergraduate women were summarized in Table IX.

TABLE IX

CRITICAL RATIOS FOR GROUP C

Critical ratio of the difference between two means for Group C	Residence and correspondence	Residence and extension class
All undergraduates	3.2	7.2
Undergraduate men	.13	1.8
Undergraduate women	2.2	7.5

The critical ratio is computed to be 3.2 for the difference between the means of residence and correspondence for all undergraduates. This is not large enough to insure significance but the probability is that ninety-eight times out of one hundred the difference is not due to chance of the sampling.

The undergraduate men have the lowest critical ratios of any group. The critical ratio computed for the difference between the means of residence and correspond-

dence in this case is .13. The chances are 53.5 out of one hundred that the computed difference is not due to inadequate sampling. In other words there is an equal chance that additional sampling would not create a change. The other critical ratio for undergraduate men is 1.8. In this case, eighty-nine times out of one hundred the computed difference would not be due to chance.

The critical ratio for undergraduate women is 2.2 for the difference between the means of residence and correspondence. The element of chance in this case is ninety-three times out of one hundred the sampling would be valid.

The two remaining critical ratios for all undergraduates and undergraduate women are 7.2 and 7.5 respectively. Here again the critical ratios of such magnitude indicate that the true difference between the residence and extension class means in both cases is significantly greater than zero and the computed difference is not due to chance of the sampling involved.

Summary for Group C. To summarize the discussion for Group C, it may be said that this study indicates:

1. Correspondence grade-point averages are generally higher than those in residence.

2. Extension class grade-point averages are generally higher than those in residence.

dence is this case is .19. The chances are 19 out of one hundred that the computed difference is not due to inadequate sampling. In other words there is an equal chance that additional sampling would not result in a change. The other critical ratio for undergraduate men is 1.8. In this case, eighty-nine times out of one hundred the computed difference would not be due to chance, for the difference between the means of residence and correspondence. The chance of chance in this case is eighty-three times out of one hundred the sampling would be valid.

The two remaining critical ratios for all undergraduates and undergraduate women are 2.3 and 2.7 respectively. Here again the critical ratios of such magnitude indicate that the true difference between the residence and extension class means in both cases is significantly greater than zero and the computed difference is not due to chance of the sampling involved.

Summary for Group D. In summarizing the discussion for Group C, it may be said that this study indicates:

1. Correspondence grade-point averages are normally higher than those in residence.

2. Extension class grade-point averages are normally higher than those in residence.

3. Extension class grade-point averages are generally higher than those in correspondence.

4. Grade-point averages for women are generally higher than grade-point averages for men.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

I. CONCLUSIONS

Marks earned through residence work at the University of New Mexico are considered standards to which marks earned by extension study are compared either favorably or unfavorably. The important conclusion derived from this study is that extension work, including both correspondence study and extension classes, compares favorably with residence instruction at this University. This conclusion is substantiated by the following findings:

1. In every case, correspondence grade-point averages were higher than residence grade-point averages.

2. In every case, extension class grade-point averages were higher than residence grade-point averages.

3. The grade-point averages of all students for extension class work were higher than those for all students enrolled in correspondence study.

4. Coefficients of correlation computed in each case indicated that another like group would earn similar marks in residence, correspondence, and extension class.

Common to the thinking of college instructors concerning the work of extension students, is the following

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

1. CONCLUSIONS

question: "Is the instruction given in extension courses as adequate as instruction in residence?" Three basic assumptions are implied by this question: (1) extension students are less capable; (2) extension instructors are more lenient because (a) the extension student is less capable or (b) the extension student is working under a handicap, being pressed both for finances and time and (3) because of these, extension work is inferior.

The validity of the assumptions just presented is clouded by many conflicting possibilities. Extension students may be overburdened with regular employment and consequently be unable to do good work. This may account for a sizeable number of concentrations of poor or mediocre extension grades. On the other hand, the working extension student may be motivated so highly that he is a very capable student. This fact may account for a relatively large number or heavy concentration of definitely superior extension grades. There is evidence that correspondence students who drop courses do so because they cannot fulfill work requirements. This would indicate that a selection process takes place, resulting in a high caliber of correspondence students.

One can only consider subjectively various possible aspects of the case. No study has yet taken into account total population in either residence, correspondence, or

extension class work. The educational standards of the institutions themselves are different. Another fact is the possibility of application by the student, to his job or profession, of the material presented through instruction. The extension student is usually so situated that immediate use can be made of acquired learnings. His office or school room is his laboratory.

One can discuss objectively studies which have been presented concerning the subject. Investigators of the relationships of various types of college study have found: (1) that extension students are typically capable of doing satisfactory residence work[1]; (2) that students who have done both residence and extension work more often rate extension teaching as superior or equal to residence teaching than as inferior[2]; (3) that students who have had both residence and extension class study, or residence and correspondence study, make higher grades in residence than students with residence study alone[3]; and (4) when the results of performance of

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[1] Herbert Sorenson, "The Abilities of Extension Students," Proceedings of the Eighteenth Annual Convention of the National University Extension Association, Vol. 16, 1933, p. 38.

[2] Marberry, op. cit., p. 56.

[3] Zeigel, op. cit., p. 225.

students on the Minnesota College Aptitude Test was compared with the results of the Minnesota Reading Test it was found that extension course students had slightly less ability than juniors and seniors in the Aptitude Test and slightly higher ability than juniors and seniors in the Reading Test.[4]

The data which have been presented neither support nor definitely refute the validity of any of the aforementioned assumptions. They do indicate clearly the relationships which have been discussed, but they do not support conclusions with respect to causes or effects.

The conclusion indicated by these considerations seems to be that one is not justified in making any of these assumptions. In fact, such evidence as does exist, seems to indicate a lack of any significant difference in quality between various methods of instruction. It is probable that no real conclusions about relative merit of various types of instruction or student work can be reached until exhaustive studies of the methods, content, and actual instruction in these courses have been completed.

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[4] Herbert Sorenson, Adult Abilities in Extension Classes (Minneapolis, Minnesota: The University of Minnesota Press, 1933), p. 56.

II. RECOMMENDATIONS

The extension service of the University of New Mexico offers many and varied kinds of courses to all kinds of people throughout the land. Extension students differ from residence students in that they are usually already employed. They are usually older and have formed their own opinions which are a reflection of their own economic and social positions. On the professional level increased preparation and technical training is required. Newer methods and ideas are developing in business and professions continually. Changing conditions in the industrial world cause changes in present positions and create new jobs. Employed people would do well to keep pace. There is an inherent desire for knowledge in almost every individual. Those who have the time, the desire, and the discipline necessary to carry on extension work want outlets for their ambitions. Well coordinated extension offerings give such people the chance to expand.

In view of this study and these considerations it can be said that there is need for much more study to develop a scientific method of evaluating extension work before adequate comparisons can be made to residence work.

Future studies on this topic should include opinions of instructors actually engaged in conducting extension classes or grading correspondence study. Their opinion as to hours spent on a particular lesson by the student, interest of the student in the course, application made of work presented in class, and capabilities of the student as viewed by the instructor, would present additional information of considerable value. On the other hand, opinions of the students enrolled in either extension class or correspondence courses concerning likes and dislikes, information received, and instructor presentation would aid materially. Such studies should include the ultimate aims of extension work and the content of the courses offered as compared to a corresponding residence class.

Considerable information could be obtained for the University of New Mexico by establishing a plan of investigation similar to that of Crump[5] in Oklahoma. Courses which are given by the three methods of instruction should be used. Groups of students who are enrolled in either residence, correspondence, or extension class could be equated, based upon the results of standardized tests. The success of such a study would be

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[5] Crump, op. cit., pp. 46-67.

based upon full cooperation of instructors conducting the courses. From such studies valuable means of comparison between the three methods of instruction would be forthcoming.

BIBLIOGRAPHY

BIBLIOGRAPHY

Bittner, Walton S., and Hervey F. Mallory, University Teaching by Mail. New York: The Macmillan Company, 1933. 349 pp.

Caton, W. Barnie, "A Study of the Extension Division of the University of New Mexico, with Emphasis on the Period 1928-1938." Unpublished Master's thesis, the University of New Mexico, Albuquerque, 1938. 108 pp.

Crump, Robert Edward, Correspondence and Class-Extension Work in Oklahoma. Southeastern State Teachers College Contributions to Education, No. 1. Durant, Oklahoma: Southeastern State Teachers College, 1928. 109 pp.

Garrett, Henry E., Statistics in Psychology and Education. Second edition; New York: Longmans, Green and Company, 1946. Pp. 311-485.

Good, Warren R., An Introduction to Statistics. Ann Arbor, Michigan: The Ann Arbor Press, 1936. Pp. 24-35.

Grumman, Russell M., University Extension in Action. Chapel Hill, North Carolina: The University of North Carolina Press, 1947. 167 pp.

Hall-Quest, Alfred Lawrence, The University Afield. New York: The Macmillan Company, 1926. 273 pp.

Klein, Arthur J., Correspondence Study in Universities and Colleges. Bulletin of the United States Office of Education, 1920, No. 10. Washington, D. C.: United States Government Printing Office, 1920. 33 pp.

Marberry, Jo. O., Extension Teaching in the University of Texas as Viewed by the Student. University of Texas Bulletin, No. 2910. Austin, Texas: The University of Texas, 1929. 65 pp.

Odell, C. W., Educational Statistics. New York: The Century Company, 1925. Pp. 245-263.

Perham, Philip D-B., Teaching by Correspondence. San Francisco: California State Department of Education, 1936. 76 pp.

BIBLIOGRAPHY

Smith, George Baxter, Purposes and Conditions Affecting the Nature and Extent of Participation of Adults in Courses in the Home Study Department of Columbia University, 1925-1932. Columbia University Contributions to Education, Teachers College Series No. 663. New York: Bureau of Publications, Teachers College, Columbia University, 1935. 86 pp.

Sorenson, Herbert, Adult Abilities in Extension Classes. Minneapolis, Minnesota: The University of Minnesota Press, 1933. 100 pp.

_____, "The Abilities of Extension Students," Proceedings of the Eighteenth Annual Convention of the National University Extension Association, Vol. 16. Bloomington, Indiana: Indiana University Press, 1933. Pp. 35-40.

Thompson, Clem Oren, The Extension Program of the University of Chicago. Chicago: The University of Chicago Press, 1933. 188 pp.

Zeigel, William Henry, The Relation of Extra-Mural Study to Residence Enrollment and Scholastic Standing. State Teachers College Bulletin, Education Series No. 2. Vol. 24, Nos. 8-9. Kirksville, Missouri: Journal Printing Company, 1924. 237 pp.

APPENDIX

CORRELATION FORM

Residence Grade-Point Averages \ Correspondence Grade-Point Averages	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd^2
3.0															1 10	1	10	10	100
2.8																0	9	0	0
2.6										1 8					1 8	2	8	16	128
2.4										2 14		1 7			3 21	6	7	42	294
2.2										7 42	2 12				4 24	13	6	78	468
2.0						1 5	2 10	3 15		7 35	2 10	3 15	1 5		2 10	21	5	105	525
1.8						2 8		1 4		6 24		2 8			1 4	12	4	48	192
1.6			2 6		4 12		4 12			8 24	3 9	2 6			1 3	24	3	72	216
1.4		2 4					5 10	6 12		9 18	3 6	2 4	2 4			29	2	58	116
1.2		4 4	1 1		14 14	2 2	8 8	2 2	3 3	7 7		1 1			2 2	44	1	44	44
1.0					22	14	7	4	6	8	2					63	0	0	0
0.8		4 -4		5 -5	8 -8											17	-1	-17	17
0.6		3 -6	7 -14		2 -4		1 -2									13	-2	-26	52
0.4		5 -15														5	-3	-15	45
0.2																0	-4	0	0
f	0	18	10	5	50	19	27	16	9	55	12	11	3	0	15	250	N	415 t	2197 w
d	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9				
fd	0	-72	-30	-10	-50	0	27	32	27	220	60	66	21	0	135	426	s		
fd^2	0	288	90	20	50	0	27	64	81	880	300	396	147	0	1215	3558	v		
E'fd	0	-17	-7	-5	14	15	38	33	3	172	37	41	9	0	82	415	t		
dE'fd	0	68	21	10	-14	0	38	66	9	686	185	246	63	0	738	2132	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{1424.84}{\sqrt{4,285,137.23}} = \frac{1424.84}{2070.1}$$

$$r = \frac{a}{\sqrt{bc}} = .688 \pm .$$

$$a = m - \frac{st}{N} = 2132 - \frac{426 \times 415}{250} = 1424.84$$

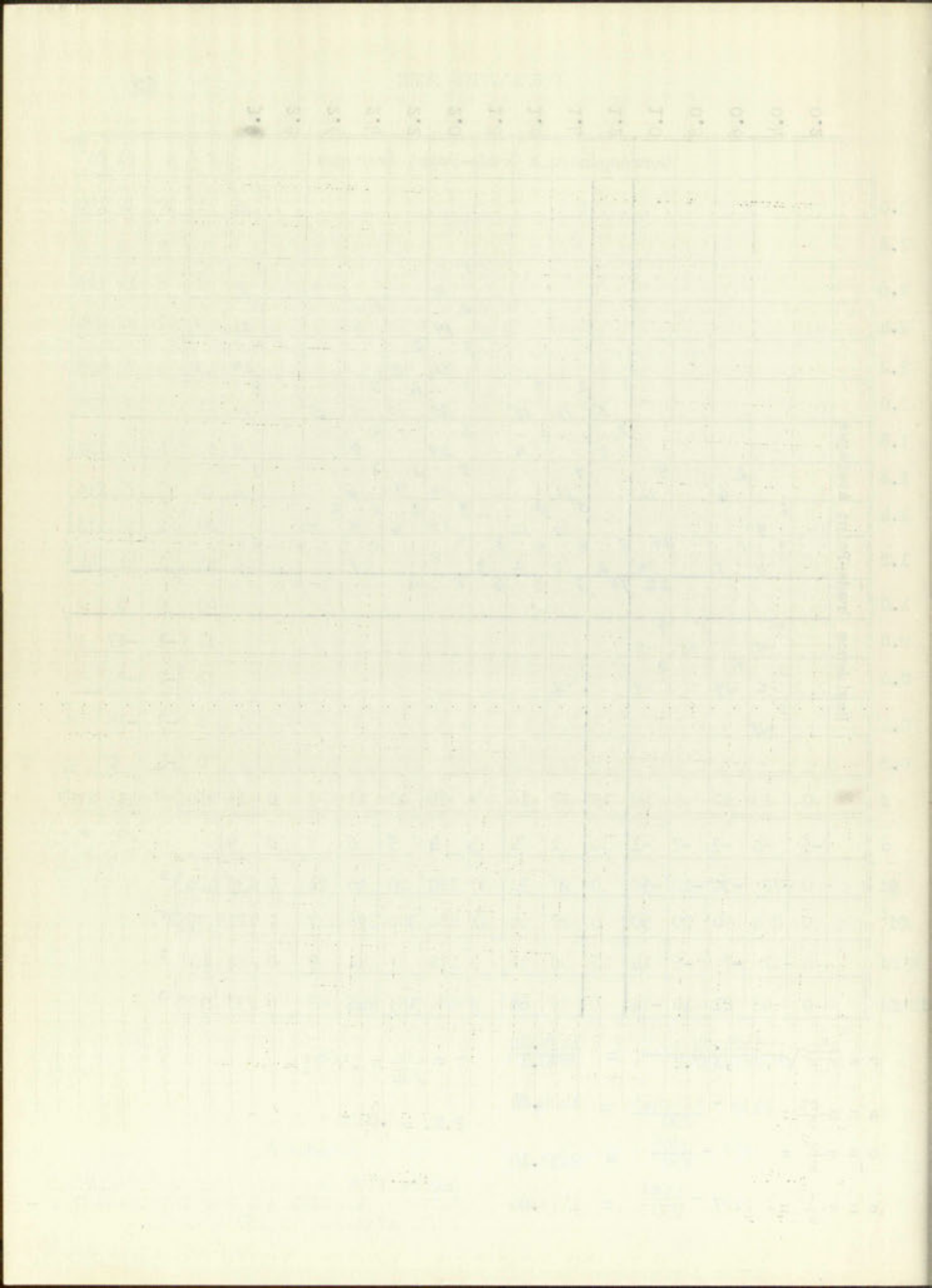
P.E. = .0220

$$b = v - \frac{s^2}{N} = 3558 - \frac{426^2}{250} = 2832.10$$

$$c = w - \frac{t^2}{N} = 2197 - \frac{415^2}{250} = 1513.06$$

EXHIBIT A

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND CORRESPONDENCE GRADE-POINT AVERAGES FOR 250 STUDENTS.



CORRELATION FORM

Residence Grade-Point Averages	Extension Class Grade-Point Averages																f	d	fd	fd²
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0					
3.0																	0	10	0	0
2.8																	0	9	0	0
2.6															1 8		1	8	8	64
2.4												1 7					1	7	7	49
2.2										5 30		1 6		3 18			9	6	54	324
2.0								1 5		7 35		4 20	3 15		2 10		17	5	85	425
1.8						1 4				2 8	2 8						5	4	20	80
1.6							2 6		2 6	9 27	2 6	1 3			2 6		18	3	54	162
1.4						5 10	4 8	1 2	4 8	10 20		5 10	2 4				31	2	62	124
1.2		2 2		1 1	3 3	8 8	10 10	3 3	2 2	3 3	2 2	4 4			2 2		40	1	40	40
1.0			2		18	10	4	9	5	6	2		2				58	0	0	0
0.8		2 -2		2 -2	7 -7	3 -3											14	-1	-14	14
0.6		1 -2	6 -12	1 -2	2 -4												10	-2	-20	40
0.4	2 -6	1 -3			3 -9												6	-3	-18	54
0.2																	0	-4	0	0
f	2	6	8	4	33	27	20	14	13	42	8	16	7	3	7		210	N	278	1376
d	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9				t	w
fd	-10	-24	-24	-8	-33	0	20	28	39	168	40	96	49	24	63		428	s		
fd²	50	96	72	16	33	0	20	56	117	672	200	576	343	192	567		3010	v		
E'fd	-6	-5	-12	-3	-17	19	24	10	16	123	16	50	19	18	26		278	t		
dE'fd	30	20	36	6	17	0	24	20	48	492	80	300	136	144	234		1587	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{1020.41}{\sqrt{2,154,758.85}} = \frac{1020.41}{1467.9}$$

$$a = m - \frac{st}{N} = 1587 - \frac{428 \times 278}{210} = 1020.41$$

$$b = v - \frac{s^2}{N} = 3010 - \frac{428^2}{210} = 2137.70$$

$$c = w - \frac{t^2}{N} = 1376 - \frac{278^2}{210} = 1007.98$$

$$r = \frac{a}{\sqrt{bc}} = .694 \pm .$$

P.E. = .0240

EXHIBIT B

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 210 STUDENTS.

CORRELATION FORM

Correspondence Grade-Point Averages	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd²
	Extension Class Grade-Point Averages																		
3.0															1 9	1	9	9	81
2.8																0	8	0	0
2.6									1 7							1	7	7	49
2.4										2 12			1 6			3	6	18	108
2.2										2 10	2 10				1 5	5	5	25	125
2.0						1 4	2 8		1 4	5 20		2 8		1 4	1 4	13	4	52	208
1.8						1 3	1 3		2 6							4	3	12	36
1.6									1 2	4 8	1 2	1 2				7	2	14	28
1.4					1 1	1 1	2 2	1 1		1 1		3 3	1 1			10	1	10	10
1.2					1 1	1 1	1 1	2 2			1 1		1 1			7	0	0	0
1.0			1 -1		8 -8	3 -3	1 -1	1 -1	1 -1							15	-1	-15	15
0.8						2 -4										2	-2	-4	8
0.6		1 -3	1 -3		1 -3					1 -3						4	-3	-12	36
0.4	1 -4	2 -8	1 -4		2 -8	2 -8										8	-4	-32	128
0.2																-	-5	0	0
f	1	3	3	0	13	11	7	4	6	15	4	6	3	1	3	80	N	84	832
																		t	w
d	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8				
fd	-6	-15	-12	0	-26	-11	0	4	12	45	16	30	18	7	24	86	s		
fd²	36	75	48	0	52	11	0	4	24	135	64	150	108	49	192	948	v		
E'fd	-4	-11	-8	0	-18	-7	12	0	18	48	12	13	7	4	18	84	t		
dE'fd	24	55	32	0	36	7	0	0	36	144	48	65	42	28	144	661	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{570.70}{\sqrt{636,358.09}} = \frac{570.70}{797.7}$$

$$a = m - \frac{st}{N} = 661 - \frac{86 \times 84}{80} = 570.70$$

$$b = v - \frac{s^2}{N} = 948 - \frac{86^2}{80} = 855.55$$

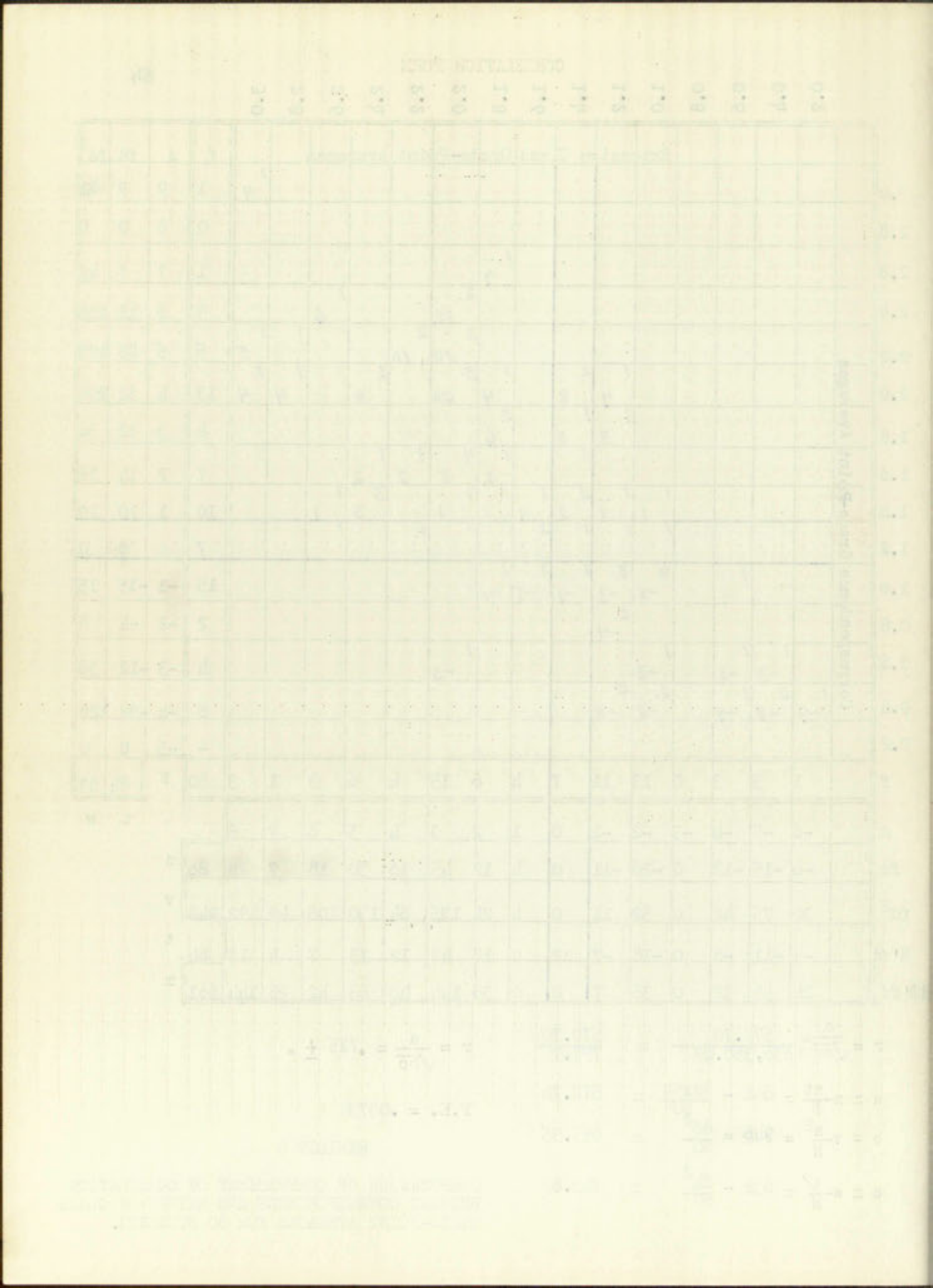
$$c = w - \frac{t^2}{N} = 832 - \frac{84^2}{80} = 743.80$$

$$r = \frac{a}{\sqrt{bc}} = .715 \pm .$$

P.E. = .0373

EXHIBIT C

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN CORRESPONDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 80 STUDENTS.



Residence Grade-Point Averages	Correspondence Grade-Point Averages: 0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd^2
3.0																0	9	0	0
2.8																0	8	0	0
2.6																0	7	0	0
2.4										1 6		1 6			2 12	4	6	24	144
2.2										1 5	2 10				4 20	7	5	35	175
2.0										5 20	2 8	3 12			1 4	11	4	44	176
1.8						2 6				4 12		1 3			1 3	8	3	24	72
1.6					3 6		1 2			5 10	3 6	2 4				14	2	28	56
1.4							1 1	2 2		4 4		2 2	2 2			11	1	11	11
1.2					2		4		2	4		1				13	0	0	0
1.0					7 -7	3 -3	5 -5	2 -2	2 -2	5 -5	2 -2					26	-1	-26	26
0.8		2 -4			1 -2											3	-2	-6	12
0.6																0	-3	0	0
0.4																0	-4	0	0
0.2																0	-5	0	0
f	0	2	0	0	13	5	11	4	4	29	9	10	2	0	8	97	N	134	672
																		t	w
d	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5				
fd	0	-16	0	0	-65	-20	-33	-8	-4	0	9	20	6	0	40	-71	s		
fd^2	0	128	0	0	325	80	99	16	4	0	9	40	18	0	200	919	v		
E'fd	0	-4	0	0	-3	3	-2	0	-2	52	22	27	2	0	39	134	t		
dE'fd	0	32	0	0	15	-12	6	0	2	0	22	54	6	0	195	320	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{418.08}{\sqrt{422,153.10}} = \frac{418.08}{649.7}$$

$$a = m - \frac{st}{N} = 320 - \frac{-71 \times 134}{97} = 418.08$$

$$b = v - \frac{s^2}{N} = 919 - \frac{-71^2}{97} = 867.03$$

$$c = w - \frac{t^2}{N} = 672 - \frac{134^2}{97} = 486.89$$

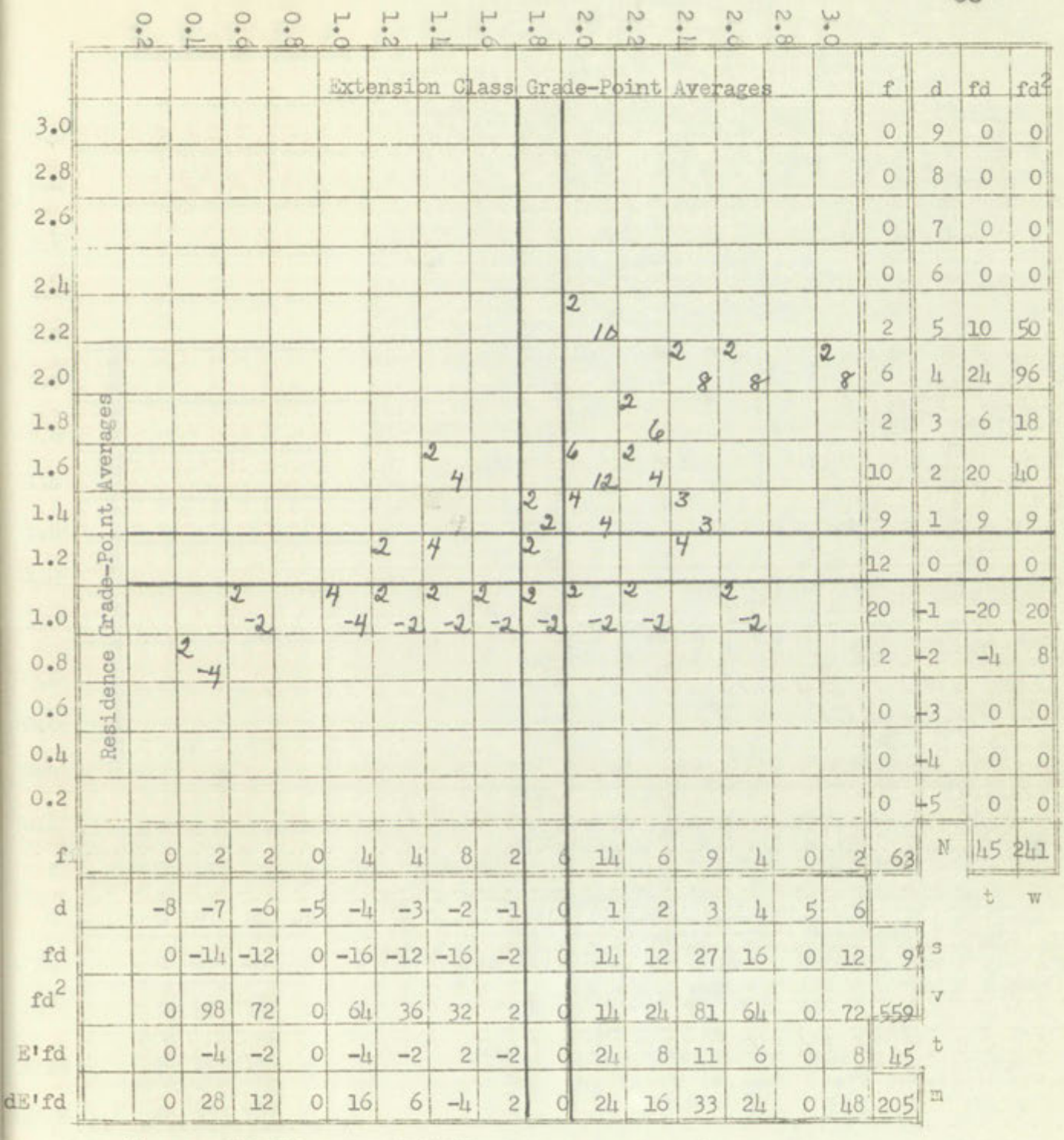
$$r = \frac{a}{\sqrt{bc}} = .6434 .$$

P.E. = .0400

EXHIBIT D

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND CORRESPONDENCE GRADE-POINT AVERAGES FOR 97 GRADUATE STUDENTS

CORRELATION FORM



	f	d	fd	fd^2
3.0	0	9	0	0
2.8	0	8	0	0
2.6	0	7	0	0
2.4	0	6	0	0
2.2	2	5	10	50
2.0	6	4	24	96
1.8	2	3	6	18
1.6	10	2	20	40
1.4	9	1	9	9
1.2	12	0	0	0
1.0	20	-1	-20	20
0.8	2	-2	-4	8
0.6	0	-3	0	0
0.4	0	-4	0	0
0.2	0	-5	0	0

f	0	2	2	0	4	4	8	2	6	14	6	9	4	0	2	63	N	45 241
d	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6			t w
fd	0	-14	-12	0	-16	-12	-16	-2	0	14	12	27	16	0	12	9	s	
fd^2	0	98	72	0	64	36	32	2	0	14	24	81	64	0	72	559	v	
E'fd	0	-4	-2	0	-4	-2	2	-2	0	24	8	11	6	0	8	45	t	
dE'fd	0	28	12	0	16	6	-4	2	0	24	16	33	24	0	48	205	m	

$$r = \frac{a}{\sqrt{bc}} = \frac{198.57}{\sqrt{116,487.49}} = \frac{198.57}{340.1}$$

$$a = m - \frac{st}{N} = 205 - \frac{9 \times 45}{63} = 198.57$$

$$b = v - \frac{s^2}{N} = 559 - \frac{9^2}{63} = 557.72$$

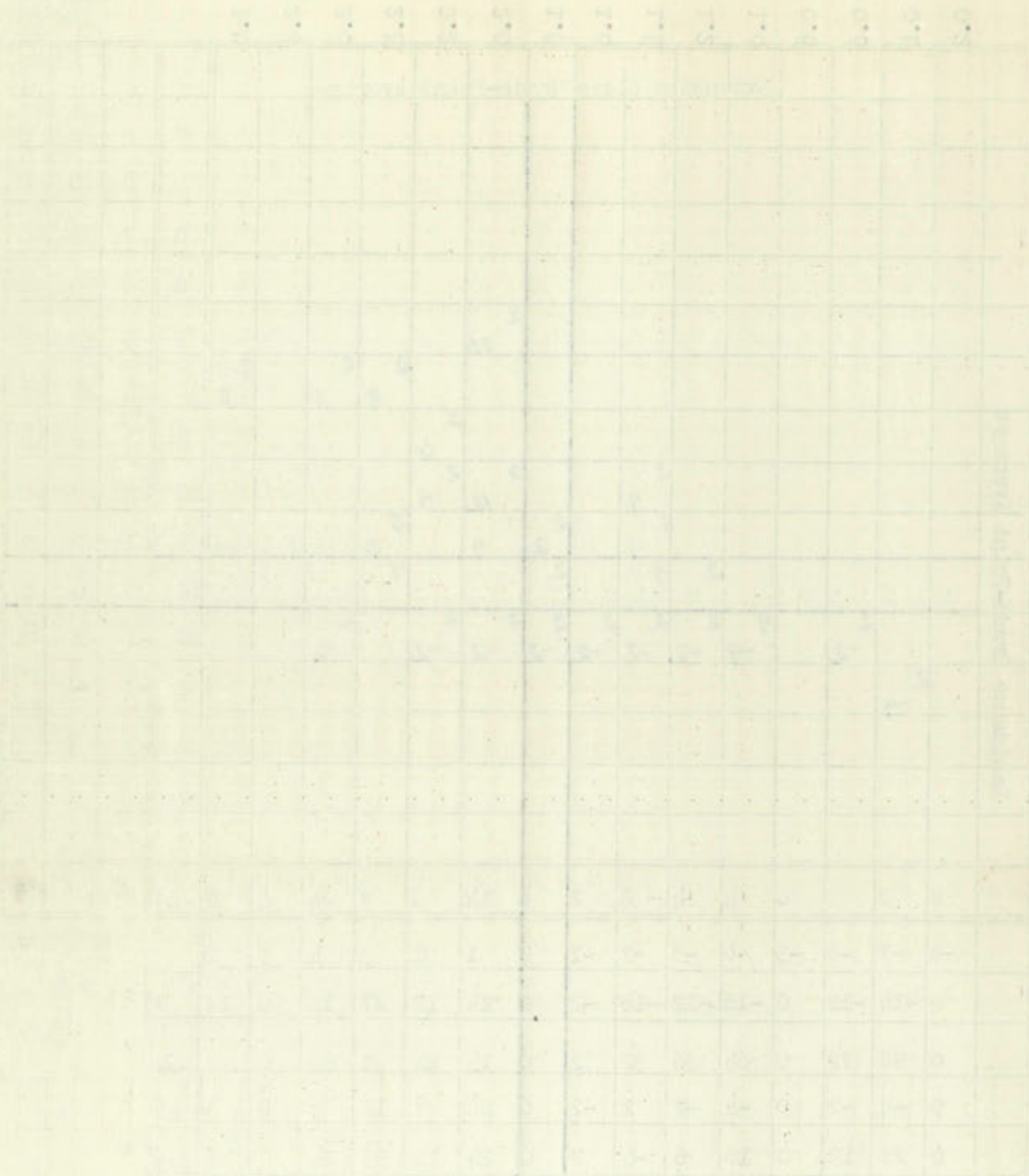
$$c = w - \frac{t^2}{N} = 241 - \frac{45^2}{63} = 208.86$$

$$r = \frac{a}{\sqrt{bc}} = .584 \pm .$$

P.E. = .0568

EXHIBIT E

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 63 GRADUATE STUDENTS.



Correspondence Grade-Point Averages \ Extension Class Grade-Point Averages	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd²
3.0																0	8	0	0
2.8																0	7	0	0
2.6									1 6	2 10			1 5		1 4	1	6	6	36
2.4										1 4	2 8					3	5	15	75
2.2							1 3		2 4	3 9		2 6				6	3	18	54
2.0											1 1		1 1			2	2	4	8
1.8						1	1	1				1 1				4	0	0	0
1.6											1 -1		1 -1			2	-1	-2	2
1.4			1 -2		2 -4	1 -2	1 -2									5	-2	-10	20
1.2																0	-3	0	0
1.0																0	-4	0	0
0.8																0	-4	0	0
0.6		1 -5														1	-5	-5	25
0.4																0	-6	0	0
0.2																			
f	0	1	1	0	2	2	3	1	3	7	3	4	2	0	1	30	N	44	286
d	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6			t	w
fd	0	-7	-6	0	-8	-6	-6	-1	0	7	6	12	8	0	6	5	s		
fd²	0	49	36	0	32	18	12	1	0	7	12	36	32	0	36	271	v		
E'fd	0	-5	-2	0	-4	-2	1	0	10	24	7	7	4	0	4	44	t		
dE'fd	0	35	12	0	16	6	-2	0	0	24	14	21	16	0	24	166	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{158.67}{\sqrt{59,834.55}} = \frac{158.67}{244.6}$$

$$a = m - \frac{st}{N} = 166 - \frac{5 \times 44}{30} = 158.67$$

$$b = v - \frac{s^2}{N} = 271 - \frac{5^2}{30} = 270.17$$

$$c = w - \frac{t^2}{N} = 286 - \frac{44^2}{30} = 221.47$$

$$r = \frac{a}{\sqrt{bc}} = .648 \pm .$$

P.E. = .0541

EXHIBIT F

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN CORRESPONDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 30 GRADUATE STUDENTS.

CORRELATION FORM

Residence Grade-Point Averages \ Correspondence Grade-Point Averages	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd²
3.0															1 9	1	9	9	81
2.8																0	8	0	0
2.6															1 7	1	7	7	49
2.4										1 6					1 4	2	6	12	72
2.2					1 5					6 30						7	5	35	175
2.0						1 4	2 8	3 12		3 12			1 4		1 4	11	4	44	176
1.8								1 3		2 6		1 3				4	3	12	36
1.6			2 4		1 2		3 6			3 6					1 2	10	2	20	40
1.4		2 2					4 4	4 4		6 6	2 2					18	1	18	18
1.2		4 1			11 2		4	2 1		2					2	29	0	0	0
1.0					15 11 -15 -11		2 -2	2 4 -2 -4		4 -4						38	-1	-38	38
0.8		2 -4		5 -10	7 -14											14	-2	-28	56
0.6		3 -9	7 -21		3 -9											13	-3	-39	117
0.4		5 -20														5	-4	-20	80
0.2																0	-5	0	0
f	0	16	10	5	38	14	15	12	5	27	2	1	1	0	7	153	N	32	938
d	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8			t	w
fd	0	-80	-40	-15	-76	-14	0	12	10	81	6	5	6	0	56	-49	s		
fd²	0	400	160	45	152	14	0	12	20	243	24	25	36	0	448	1579	v		
E'fd	0	-31	-17	-10	-31	-7	16	17	-4	62	2	3	4	0	28	32	t		
dE'fd	0	155	68	30	62	7	0	17	-8	186	8	15	24	0	224	788	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{798.25}{\sqrt{1,455,936.24}} = \frac{798.25}{1206.6}$$

$$a = m - \frac{st}{N} = 788 - \frac{-49 \times 32}{153} = 798.25$$

$$b = v - \frac{s^2}{N} = 1579 - \frac{-49^2}{153} = 1563.31$$

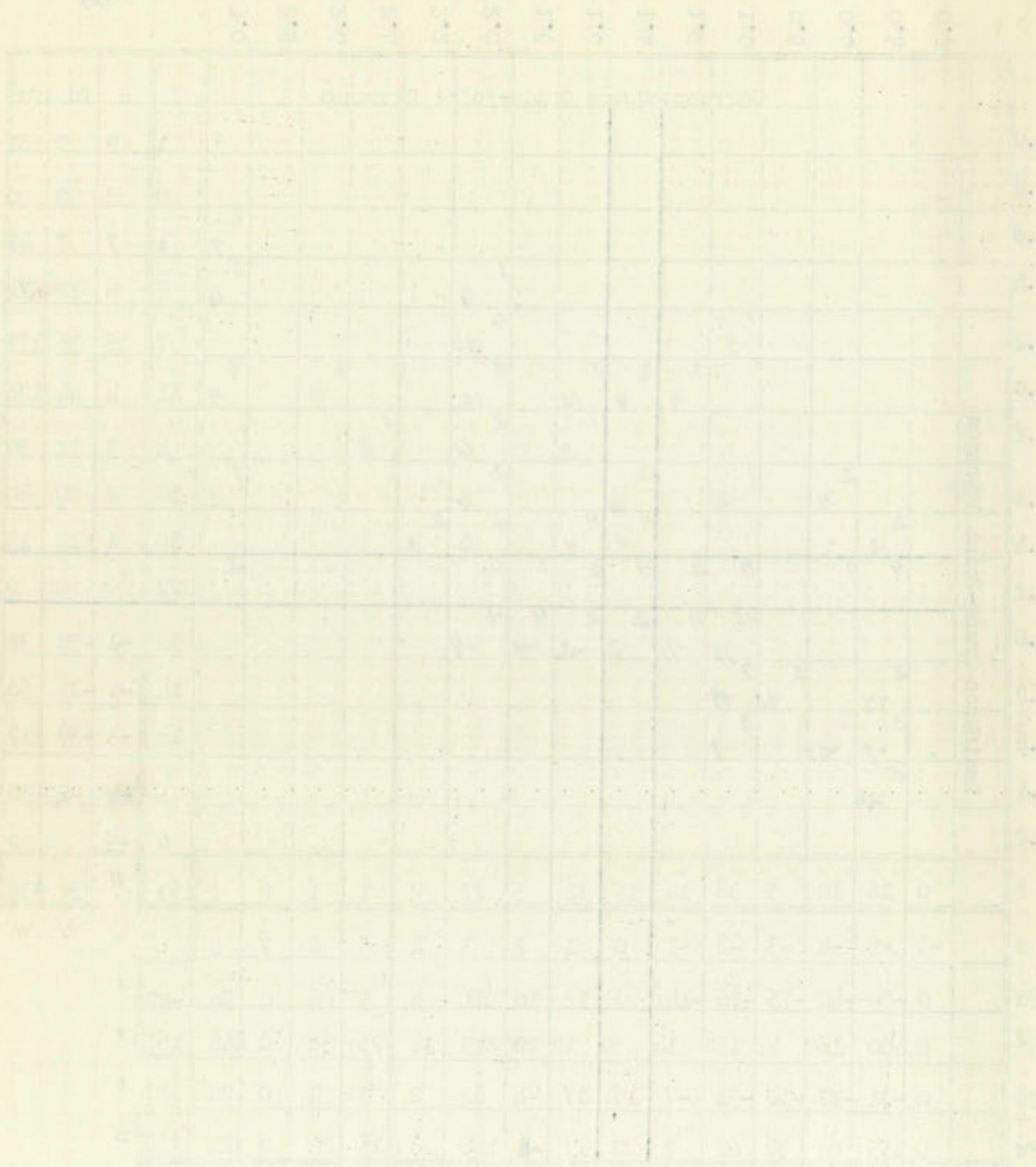
$$c = w - \frac{t^2}{N} = 938 - \frac{32^2}{153} = 931.31$$

$$r = \frac{a}{\sqrt{bc}} = .661 \pm .$$

P.E. = .0307

EXHIBIT G

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND CORRESPONDENCE GRADE-POINT AVERAGES FOR 153 UNDERGRADUATE STUDENTS.



CORRELATION FORM

Residence Grade-Point Averages \ Extension Class Grade-Point Average	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd²
3.0																0	10	0	0
2.8																0	9	0	0
2.6															1 8	1	8	8	64
2.4												1 7				1	7	7	49
2.2										3 18		1 6		3 18		7	6	42	252
2.0								1 5		7 35		2 10	1 5			11	5	55	275
1.8						1 4				2 8						3	4	12	48
1.6									2 6	3 9		2 6			2 6	9	3	27	81
1.4						5 10	4 8	1 2	2 4	6 12		1 2	2 4			21	2	42	84
1.2					3 3	6 6	6 6	3 3		3 3	2 2				2 2	28	1	28	28
1.0					14	8	2	7	3	4						38	0	0	0
0.8				2 -2	6 -6	4 -4										12	-1	-12	12
0.6		1 -2	6 -12	1 -2	2 -4											10	-2	-20	40
0.4	3 -9				3 -9											6	-3	-18	54
0.2																0	-4	0	0
f	3	3	6	4	28	24	12	12	7	28	2	7	3	3	5	147	N	171	987
d	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9			t	w
fd	-15	-12	-18	-8	-28	0	12	24	21	112	10	42	21	24	45	230	s		
fd^2	75	48	54	16	28	0	12	48	63	448	50	252	147	192	405	1838	v		
E'fd	-9	0	-12	-3	-16	16	14	10	10	85	2	31	9	18	16	171	t		
dE'fd	45	0	36	6	16	0	14	20	30	340	10	186	63	144	144	1054	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{786.45}{\sqrt{2,184,809.17}} = \frac{786.45}{1478.1}$$

$$r = \frac{a}{\sqrt{bc}} = .532 \pm .$$

$$a = m - \frac{st}{N} = 1054 - \frac{230 \times 171}{147} = 786.45$$

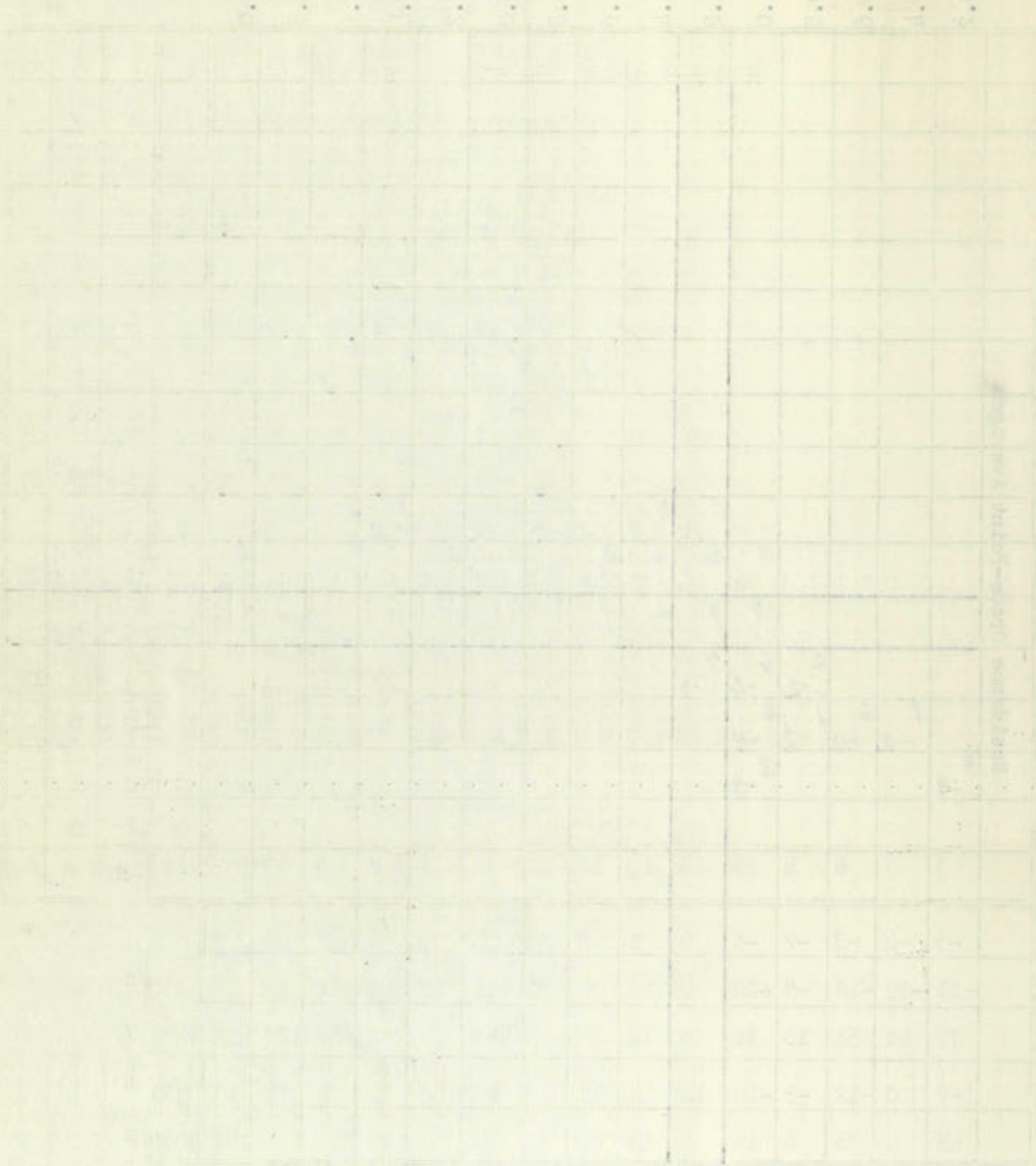
P.E. = .0395

$$b = v - \frac{s^2}{N} = 1838 - \frac{230^2}{147} = 1478.14$$

$$c = w - \frac{t^2}{N} = 987 - \frac{171^2}{147} = 788.08$$

EXHIBIT H

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN RESIDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 147 UNDERGRADUATE STUDENTS.



CORRELATION FORM

Correspondence Grade-Point Averages \ Extension Class Grade-Point Averages	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	f	d	fd	fd²
3.0															1 (10)	1	10	10	100
2.8																0	9	0	0
2.6																0	8	0	0
2.4																0	7	0	0
2.2										1 (6)						1	6	6	36
2.0						1 (5)	1 (5)		1 (5)	2 (10)				1 (5)	1 (5)	7	5	35	175
1.8						1 (4)	1 (4)									2	4	8	32
1.6									1 (3)	3 (9)	1 (3)					5	3	15	45
1.4					1 (2)		1 (2)			1 (2)		2 (4)	1 (2)			6	2	12	24
1.2					1 (1)	1 (1)	1 (1)	2 (2)								5	1	5	5
1.0					6	2		1	1							10	0	0	0
0.8						2 (-2)										2	-1	-2	2
0.6		1 (-2)	1 (-2)		1 (-2)					1 (-2)						4	-2	-8	16
0.4	1 (-3)	1 (-3)	1 (-3)		2 (-6)	2 (-6)										7	-3	-21	63
0.2																0	-4	0	0
f	1	2	2	0	11	9	4	3	3	8	1	2	1	1	2	50	N	60	498
																		t	w
d	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9				
fd	-5	-8	-6	0	-11	0	4	6	9	32	5	18	7	8	18	77	s		
fd²	25	32	18	0	11	0	4	12	27	128	25	108	49	64	162	665	v		
E'fd	-3	-5	-5	0	-5	2	12	2	8	25	3	4	2	5	15	60	t		
dE'fd	15	20	15	0	5	0	12	4	24	100	15	24	14	40	135	423	m		

$$r = \frac{a}{\sqrt{bc}} = \frac{330.60}{\sqrt{232,774.92}} = \frac{330.60}{482.4}$$

$$r = \frac{a}{\sqrt{bc}} = .685 \pm .$$

$$a = m - \frac{st}{N} = 423 - \frac{77 \times 60}{50} = 330.60$$

P.E. = .0510

$$b = v - \frac{s^2}{N} = 665 - \frac{77^2}{50} = 546.42$$

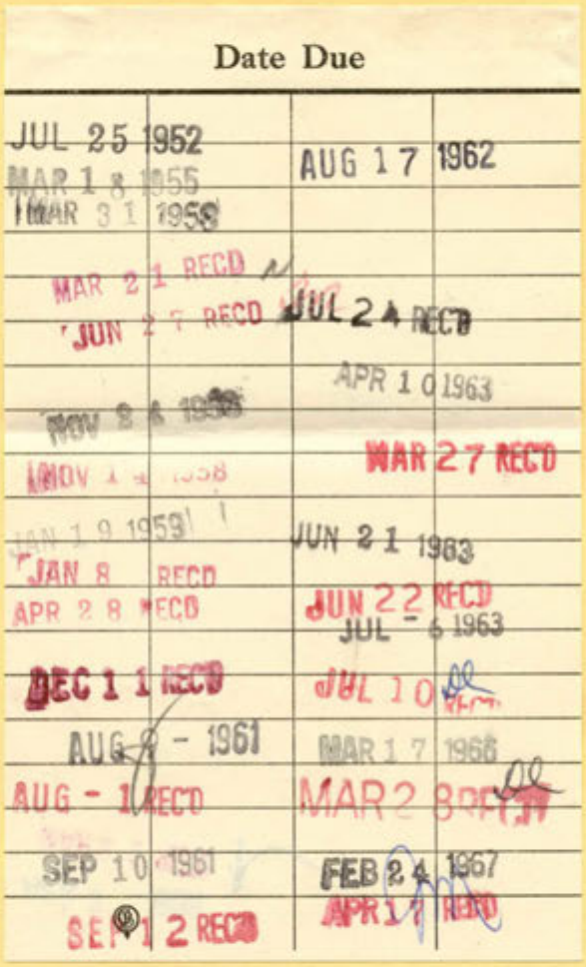
$$c = w - \frac{t^2}{N} = 498 - \frac{60^2}{50} = 426.00$$

EXHIBIT I

COMPUTATION OF COEFFICIENT OF CORRELATION BETWEEN CORRESPONDENCE AND EXTENSION CLASS GRADE-POINT AVERAGES FOR 50 UNDERGRADUATE STUDENTS.

IMPORTANT!

Special care should be taken to prevent loss or damage of this volume. If lost or damaged, it must be paid for at the current rate of typing.



Date Due

JUL 25 1952
MAR 18 1955
MAR 31 1958
MAR 21 RECD
JUN 25 RECD
NOV 8 A 1958
NOV 14 1958
JAN 19 1959
JAN 8 RECD
APR 28 RECD
DEC 11 RECD
AUG 8 - 1961
AUG - 1 RECD
SEP 10 1961
SEP 12 RECD

AUG 17 1962
JUL 24 RECD
APR 10 1963
MAR 27 RECD
JUN 21 1963
JUN 22 RECD
JUL - 6 1963
JUL 10
MAR 17 1966
MAR 28
FEB 24 1967
APR 17 RECD

DIETER BINDS BETTER