THE MATHEMATICS NEWSLETTER

OF THE UNIVERSITY OF IDAHO

VOL. V, No. 1, November 1961

Hans Sagan, Editor

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From the Editor:

A total of 1312 students are presently enrolled in Mathematics Classes at the University of Idaho as opposed to 1127 last year. In addition, we have now 15 graduate students working towards a Ph. D. degree; some of these students are now in the last phase of their studies and it is hoped that a number of Doctor degrees in Mathematics will be conferred at the 1962 commencement exercises. This expansion of our program places a heavy burden on the Mathematics Faculty which has not been increased over the past years. In spite of this, the Mathematics Faculty voted, at the first faculty meeting this year, to continue the publication of the Mathematics Newsletter at the rate of two issues per year. The many favourable comments we received from the High Schools in our state make us realize that there is a definite need for this link between you who teach mathematics on the front lines, often under adverse circumstances, and the Department of Mathematics at your University. As before, we welcome critizisms and suggestions for improvement of this publication.

ON PERFECT NUMBERS

By Delmar L. Boyer

A positive integer is called perfect if the sum of its positive integral divisors is equal to twice the number. If we express the number of divisors of a positive integer m by $\sigma(m)$, then we may express the condition for a number being perfect as $\sigma(m) = 2m$. For example, 6 is a perfect number since the only positive integral divisors of 6 are 1, 2, 3, and 6 itself. Therefore $\sigma(6)=1+2+3+6=12 = 2\cdot 6$. Also, since $\sigma(28) = 1 + 2 + 4 + 7 + 14 + 28 = 2\cdot 28$, 28 is a perfect number. (The reader may want to check the numbers 496 and 8128, which are also perfect.) There are many unsolved problems and some solved problems connected with this simple concept, and the purpose of this paper is to discuss some of these.

People have been interested in perfect numbers for many centuries, as is evidenced by the fact that Euclid was the first to prove that if $2^{m+1}-1$ is a prime then $2^m(2^{m+1}-1)$ is perfect. For the proof of this we need a formula for $\sigma(m)$. If

$$m = p_1^{\alpha_1} \cdots p_r^{\alpha_r}$$

is the factorization of m into a product of primes [Newsletter, Vol I, No. 4, p. 7], then each divisor of m is a number of the form

$$p_1^{\beta_1} \cdots p_r^{\beta_r},$$

where each β_i is smaller than or equal to the corresponding α_i. Hence each divisor of m occurs exactly once as a summand in the expansion of

$$(1 + p_1 + p_1^2 \cdots + p_1^{\beta_1})(1 + p_2 + p_2^2 + \cdots + p_2^{\beta_2})\cdots$$

$$(1 + p_r + p_r^2 + \cdots + p_r^{\beta_r}).$$

and thus this expression is equal to $\sigma(m)$. Notice that the expression can also be written as

$$\sigma(m) = \frac{p_1^{\beta_1}-1}{p_1-1} \cdot \cdots \cdot \frac{p_r^{\beta_r}-1}{p_r-1}.$$

To see this, just multiply

$(1 + p + p^2 + \ldots + p^r)$ by $(p - 1)$.

Now if we let $2^{m+1} - 1 = p$, where p is a prime, we have by our formula that

$$\sigma(2^m(2^{m+1}-1)) = \sigma(2^m \cdot p) = \frac{2^{m+1}-1}{2-1} \cdot \frac{p^2-1}{p-1} = (2^{m+1}-1)\cdot(p+1),$$

but

$$p + 1 = 2^{m+1}, \text{ thus } \sigma(2^m(2^{m+1}-1)) = 2^{m+1}(2^{m+1}-1).$$ This

proves that $2^m(2^{m+1}-1)$ is perfect.

It wasn't until the 18th century that Euler proved the converse of this theorem, that every even perfect number is of the stated form. Thus the determination of all even perfect numbers was reduced to the determination of the numbers p such that $2^p - 1$ is a prime. (Of course, p itself must be a prime, since

$$(2^{a \cdot b} - 1) = (2^a - 1)(1 + 2^a + 2^{2a} + \ldots + 2^{(b-1)a}))$$

The only known primes, p, for which $2^p - 1$ is also a prime, are the numbers 2, 3, 5, 7, 13, 17, 19, 31, 61, 89, 107, 127, 521, 607, 1297, 2203, 2281, and 3217. The last of these wasn't discovered until 1957 and the last 6 have all been discovered since 1956. The reason for this late discovery is that the computational task is so great that it couldn't be done until high speed computers were available.

Thus we have a partially solved problem, the characterisation of even perfect numbers in the stated form. The weak part of this solution is that the numbers p, for which $2^p - 1$ is prime aren't known. It is not even known whether or not there are an infinite number of them. (cf. This Newsletter, Vol. I, No. 4, p. 6).

The situation is much worse with respect to odd perfect numbers. No one knows if there is such a thing or not, although many theorems on the assumption that there are, have been proved e.g. if m is an odd perfect number, then m has at least 5 distinct prime factors.

Let me leave the reader with the following easy problem: Show that there is no odd perfect number with exactly one or with exactly two distinct prime factors.

(Hint: if $\sigma(p_1^{\alpha_1} p_2^{\alpha_2}) = 2p_1^{\alpha_1} p_2^{\alpha_2}$, then $2 = \frac{p_1^{\alpha_1+1} - 1}{p_1 - 1} \cdot \frac{1}{p_1^{\alpha_1}} \cdot \frac{p_2^{\alpha_2+1} - 1}{p_2 - 1} \cdot \frac{1}{p_2^{\alpha_2}}$, but how big can the expression on the right be?)

DIGITAL COMPUTERS

By Ward H. Crowley

During the past fifteen years (principally in the past ten) we have witnessed the invention and development of large scale electronic digital computers. The impact of these computers upon science, upon business, and upon our very lives we can as yet scarcely comprehend. Computer services have been expanded in recent years, until now they are involved in a substantial percentage of our national effort and progress. Money spent for computers and computer service is a substantial part of our national income.

The term digital refers to the fact that these machines deal with discrete numbers. They are able to carry out a limited number of basic operations which include arithmetic operations such as add and multiply, imput-output operations such as read cards and punch cards, control operations such as shift typewriter carriages and rewind tape. They are also able to make a limited number of logical decisions. As an example a number may be examined to determine if it is negative, zero, or positive. The computer will then proceed in a different manner with each alternative.

Each of the basic operationsis designated by a number and it is these numbers that make up the language the machine understands. The solution of any particular problem must be expressed as a sequence of these operations codes. This sequence is called a program and the process of preparing it is called programming. The program is stored in the "memory" of the computer as magnetized spots on a rotating drum or as magnetization of small ferrite cores. Each position in memory has an address, just as a house in a city has, by means of which its information or instruction may be located. A program instruction must contain the operation code which tells the machine what to do, a data address which tells the machine where to get the number it is to add or to multiply by, and it must have an instruction address which tells the machine where to look for the next instruction. In some machines the next instruction is located at the next address in sequence so the instruction address need not be specifically stated.

A clever programmer can use the basic machine operations and machine language to solve very complicated problems. For example, a computer may be used to compute the orbit of a satallite or of a planet, to predict weather, to design aircraft wings or automibile engines. It may be used to determine the most economical business operations or to control the flow of materials in an industrial plant. Computers may even be used to compose music, and to write western novels. They may be programmed to play games, and to learn to improve their games with practice. Among such games are very serious ones such as war games. Computers are frequently used to write programs for themselves. They have even been used to formulate the rules for writing these programs.

The above represent only a few of the possible uses to which computers may be put. The possibilities for their use are so numerous and the demand for people who are trained to operate them is so great that we feel the University has the responsibility to help train people in computer programming and in computer uses.

The University of Idaho does not, at the present time, have a computer, but we hope this deficiency will soon be remedied. We do offer a course in the Mathematics Department on digital computers, and when a machine is available we will be able to do more than we are now doing.

FRESHMAN MATHEMATICS

By Elna H. Grahn

Supervisor of Freshman Mathematics

The University of Idaho offers two different one year sequences in mathematics for freshmen, Mathematics 1-2 (Fundamentals of Mathematics) and Mathematics 11-12 (Elementary Mathematical Analysis). These courses differ in objectives, prerequisites, credit, and content selected to achieve the objectives.

The Mathematics 1-2 sequence is designed for students in curricula requiring only one semester or one year of college mathematics and for students who choose it as an elective to learn more of the nature of mathematics. Students enrolled in curricula in which it is desired or required that one have more than one year of college mathematics follow the 11-12 sequence if qualified.

Fundamentals of Mathematics (1-2) is a terminal course stressing the nature of mathematics, its fundamental concepts, skills, and applications rather than the development of manipulative skills of an involved nature. It is hoped that the student will achieve an appreciation of the origin and development of basic mathematical ideas, knowledge of and respect for critical logical reasoning, understanding of mathematics as a branch of human endeavor, and facility in applying fundamental mathematical concepts and techniques to simpler problems including some developments of recent years. The concept of logical structure is carried through the entire course, thus making the course valuable not only to students who require some facility in basic techniques of algebra, trigonometry, analytic geometry, and calculus, but also to students of the arts and social sciences. Although they themselves can use only basic mathematics, all students should learn how to use mathematicians; that is, they should know enough of the nature and concepts of mathematics to know what they can expect mathematicians to do for them.

Elementary Mathematical Analysis (11-12) is designed as a rigorous course in the development of the concepts and techniques of algebra, trigonometry, and analytic geometry with an introduction to calculus. It is intended to give the students a sound foundation for further study in mathematics, science, and engineering. All too few students are fully prepared for Math. 11. It is recommended that two full years of algebra be taken in high school before entering this course; the full second year of algebra is far more essential than trigonometry, solid geometry, or both. Each fall we find we must ask about one-fourth of the students to withdraw from Math 11 because of lack of algebraic facility, and very few students complete the course with an "A" grade.

Each fall after a two week intensive review of advanced algebra, the Department administers an algebra achievement test to the Math. 11 students. On the basis of results, we recommend that students who appear to be unqualified drop Math. 11 and take Math. 1. After successful completion of Math. 1, they take Math. 11 for 3 rather than 5 credits because there is some duplication. They then take Math. 12 for 5 credits.

For those students especially well qualified on entrance, two challenging opportunities are available. For those who have had the equivalent of Math. 11 in high school, a challenge exam may be taken. If passed with a grade of C or better, the student isallowed 5 credits toward degree requirements and may then enroll in Math 12. The student may challenge both Math. 11 and 12 and enroll in 51 if both are passed at the required level. For others who may not have covered the equivalent of Math 11 in high school but who show high aptitude and sufficiently good algebraic achievement (as evidenced by our test), an accelerated section of Math. 11-12 is provided. The pace is faster and the material is covered in greater depth. At the successful completion of both semesters, the student is allowed 14 credits since not only the 11-12 material but also that of Math. 51 has been covered.

For those students in any of the freshmen courses who have difficulty in mathematics, the department has a Mathematics Laboratory, It is held in a large room with tables where students may study with others or alone. The staff comprises graduate students in mathematics and the supervisor of freshman mathematics with additional help from senior mathematics majors when needed. The laboratory is open from 3 p.m. to 5 p.n. every afternoon with an additional hour from 2 to 3 on Tuesday and Thursday. It operates on a voluntary basis; however, we ask students to sign an attendance sheet so that we may be able to judge the effectiveness of the laboratory and to assign sufficient staff. The function of the staff is to help students understand the principles involved and develop the necessary facility with operations, not merely to get the assignment done as quickly as possible. Last year the flunk rate in Math. 11 was cut 10 per cent from past years, the department gives credit to the Mathematics Laboratory for much of this cut.

Some may be concerned with sizes of our sections in freshman mathematics. In addition to its being a necessity, large classes have certain advantages. In connection with each topic, there are questions which should be asked. Answering a question for 10 rather than 3 students is efficient and the appropriate question is more apt to be asked in a large class. But the greatest advantage is in the attitude of the students. In small classes the students seem to feel that it is up to the instructor to "get them through" with a minimum of effort on the part of the student. However, in a large class students seem to accept more responsibility and to work harder.

The Mathematics 11 enrollment was originally well over 400 this fall, there being 3 sections of 125-140 and an accelerated section of 35. After the withdrawls during the first two weeks, 393 students took the algebra achievement test on Oct. 6.

Three comparable forms, one of which is appended, were administered. A score of 67 was possible and was achieved by 2 students--both women. The median was 38 (56.7 per cent); 24 students had scores of 60 or above, 44 had scores of 54 or above, 117 had scores of 47 or above, and 180 students had scores of 40 or above. 77 students, about 1/5 of the total, had scores of 24 or less.

It was recommended that those with scores of 40 or above remain in Math. 11, that those with scores of 24 or less withdraw and enroll in Math 1. Those below 40 and above 24 were advised to take a makeup exam (of the same nature as the original) on October 10. Some students with scores of 24 and less chose to take it also. On the basis of this makeup exam, we recommended that students with grades of 42 or better remain in Math. 11, (67 possible) that those with 36 or less withdraw and that those in the intermediate range withdraw unless determined to study.

Complete statistics are not available for all sections on a comparable basis. Those for sections A and B, both large sections, are available and serve as the basis for the remaining analysis. Since they comrpise over 60 per cent of the total Math. 11 enrollment, they should serve as a fair sample.

Of the 77 students with scores of 24 or less, 48 were enrolled in sections A and B. Of these 48, 26 withdrew immediately, 4 did not take the makeup exam but chose to remain in Math. 11, and 18 took the makeup exam. Of these 18, 8 made scores in the 30's and withdrew; the remaining 10 chose to remain in Math. 11 although only 5 had scores above 43, 3 were in the intermediate range, and 2 were below 36.

In Sections A and B, there were 85 students with 1st test scores of 25-39. Although they were eligible to take the makeup exam, 13 did not and all but 4 of those subsequently withdrew. A score of 43 or better was achieved by 41; however, 3 subsequently withdrew. Of the 18 with scores of 37-42, 11 remained and 7 withdrew; of the 13 with scores of 36 or less, 6 remained and 7 withdrew.

Although results, in terms of mid-terms or final grades, are not available for analysis, it may be of interest to examine results from last year. In Section A last fall, there were 90 students for whom we have both the algebra achievement test scores and a final grade other than withdrawal. In the following table, letter grade is final grade (FG); AA indicates algebra achievement scores in various ranges. Max. score was 65, 28-36 was makeup range, 27 and below drop range.

FIRST SEMESTER 1960-61 MATHEMATICE 11 ANALYSIS

FG \ AA	No.	65-51	37-50	28-36	27-less
A	10	9	1	0	0
B	15	12	3	0	0
C	19	3	8	7	1
D	28	5	17	4	2
F	18	0	7	5	6
TOTAL	90	29	36	16	9

Examination of this table indicates that neither A nor B was achieved by any student who did not pass the algebra achievement test. Twenty-five students remained last fall from this group in one section as comp red with 35 in two sections this fall. The 3 students in the low group who received C or D attended the Math. Laboratory almost every day during the semester; the two who received D--twins incidentally--were equally diligent in Math. 12 with gratifying results, final grades of C and B. Unfortunately, not all who passed the achievement test passed the course, and neither did all of those who did very well on the test do equally well in the course. Some students who had high aptitude scores and apparently an excellent background did not take advantage of the Mathematics Laboratory even after receiving low grades on hour examinations.

It is our hope that we will challenge all students to the point of their achieving at the highest level commensurate with their abilities and backgrounds. To that end some students have transferred from a regular to the accelerated [illegible] section. We recognize that our hopes are not realistic goals, but we try to provide every opportunity for students who are earnest to get the most out of the offerings in mathematics at the University.

Math. 11 Test

6 October 1961

Part I (1 pt. each)

State whether each of the following is true or false.

1. $\sqrt{x^2 - y^2} = x - y$
2. $ab = 0 \Rightarrow a = 0$ and $b = 0$.
3. $\frac{a}{b} = \frac{a+2}{b+2}$
4. $-1 < -4$.
5. The reciprocal of $m + n$ is $\frac{1}{m} + \frac{1}{n}$
6. $\frac{x}{y} = 0 \Rightarrow x = 0$.
7. $\frac{0}{0} = 1$.
8. $\frac{c - d}{3} = -\frac{d - c}{3}$
9. $(m + n)(n - m) = m^2 - n^2$.
10. $cd = 0 \Rightarrow c = 0$ or $d = 0$.
11. $\frac{x}{a+b} = \frac{x}{a} + \frac{x}{b}$.
12. If $x = -4$, $\frac{x^2 - 16}{x - 4}$ is undefined.

Part II (3 pts each)

Write in the blank before each of the following statements the number of the choice that correctly completes the statement.

1. $[\frac{x^3}{y^2} + \frac{x^2}{y^3}]^{-3}$ is equal to (1) x^3y^3, (2) $\frac{1}{x^3y^3}$, (3) $x^{\frac{1}{3}}y^{\frac{1}{3}}$ (4) $\frac{1}{x^{\frac{1}{3}}y^{\frac{1}{3}}}$ (5) none of these.
2. The expression $x^{-1} - y^{-1}$ is equal to (1) $\frac{1}{x-y}$ (2) $\frac{xy}{x-y}$ (3) $\frac{x-y}{xy}$, (4) $\frac{y-x}{xy}$ (5) none of these.
3. $(-3x)^0$ equals (1) c, (2) -3, (3) 1, (4) -1, (5) none of these.
4. The fraction $\frac{3r^2 - 2r}{6r}$ is equal to (1) $r - 1$, (2) $\frac{r}{6}$, (3) $\frac{3r^2 - 1}{3}$ (4) $\frac{3r - 2}{6}$ (5) none of these.
5. $\sqrt{-18x^2}$ is equal to (1) $-3x\sqrt{2}$ (2) $3xi\sqrt{2}$ (3) $3i(x+\sqrt{2})$ (4) $9xi$ (5) none of these.

6. $\frac{4 - \sqrt{3}}{2 - \sqrt{3}}$ is equal to (1) 2, (2) $5 + 2\sqrt{3}$ (3) 3, (4) $11 - 6\sqrt{3}$ (5) none of these.

7. $\frac{x^2 - 9}{x - 3} = x + 3$ for (1) all values of x, (2) all values of x except -3, (3) all values of x except 0, (4) no values of x, (5) none of these.

8. $8^{\frac{4}{3}}$ is equal to (1) 8 (2) 16, (3) $10\frac{2}{3}$ (4) $\frac{10}{3}$ (5) none of these.

9. The product $\frac{2x + 2y}{x + y} \cdot \frac{(x - y)^2}{x^2 - y^2}$ is equal to (1) -2xy, (2) 2, (3) $\frac{2(x+y)}{x - y}$ (4) $\frac{2(x-y)}{x + y}$ (5) none of these.

10. A true theorem from advanced mathematics states: "If a function is differentiable, then it is continuous." On the basis of this only, which of the following statements is true?
    1) If a function is not differentiable, it is not continuous
    2) If a function is not continuous, it is not differentiable.
    3) If a function is continuous, it is differentiable.
    4) If a function is not continuous, it is differentiable.
    5) None of these.

III. Show all work in the space provided. (5 pts. each)

1. $b^2 - c^2 + ab - ac$ (factor completely)
2. Find all values of x which satisfy: $\sqrt{4 - x} = 2 - x$.
3. Find all values of x which satisfy: $2x - \frac{7}{x-5} = 10 + \frac{7}{5-x}$
4. Simplify: $(\frac{x+y}{x-y} - \frac{x-y}{x+y}) \div (\frac{1}{x+y} - \frac{1}{x-y})$
5. If A can do a job alone in 15 hours and B can do it alone in 10 hours, how long will it take them to do the job together?

HOW TO OBTAIN A MATHEMATICS DEGREE AND A SECONDARY TEACHING CERTIFICATE SIMULTANEOUSLY

By Hans Sagan

It is a widely spread belief that a secondary teaching certificate can only be obtained by students who are enrolled in the College of Education. This is not true at all. As a matter of fact, only 20 credits of courses offered by the College of Education are required to qualify for a secondary teaching certificate. 3 of these credits may be taken in Psychology 55 or 56 (Human Growth and Development) and 6 of these credits are to be taken in practice teaching. This leaves 11 credits of formal course work in Education.

To obtain a B. S. from the College of Letters and Science in Mathematics with a minor in one of the sciences, the following courses have to be taken to satisfy the general Letters and Science requirements:

English Composition	6 credits
Humanities	7-9 credits
Social Science	7-9 credits (Psych. 55-56 qualifies as a Social Science course)
Foreign Language	0-16 credits (two years of language in high school reduce this requirement to 8 credits)
TOTAL	17-40 credits

To satisfy the requirements for a major in Mathematics, the following courses have to be taken.

Math. 11-12	10 credits
Math. 51-52	8 credits
Upper division courses in Mathematics	20 credits
TOTAL	38 credits

Adding up the required credits in Education, General Letters and Science requirements and Mathematics, we obtain 75-98 credits. Since 128 credits are required for graduation, this leaves 30-50 credits for the general University requirements, like Physical Education, Military Science, Healthful Living, and a sufficient amount of credits for a minor in Physics, Chemistry, Biolo ical Sciences, Georgraphy,or Geology.

It is needless to point out, that a graduate in a curriculum as described above is in a very advantageous position. Not only will he be acceptable to any graduate school--provided his grades are good--to pursue studies towards a M. S. degree in Mathematics, or a Ph. D. for that matter; he willbe a trained Mathematician and as such capable to impart knowledge in his chosen area, which supposedly is, what constitutes the process of teaching. It is also quite obvious, that such a candidate will be in a very good bargaining position. High Schools are in desperate need of highly qualified personnel and many schools are willing and capable of paying well for such services.

It may be argued, that this curriculum isa very tough one and not just anybody may be able to go through it. Right. We do not want just anybody to teach Mathematics in our High Schools. The National Science Foundation spends millions of tax dollars every year through grants to Universities to conduct

Science Institutes for High School teachers in Science and Mathematics to improve their subject matter knowledge. The University of Idaho has been conducting such Institutes for the past five years. It is our experience that most teachers that attend these Institutes, with a very few exceptions, are extremely eager to learn and quite capable of digesting and mastering advanced material as presented by us. The age of the participants ranges from 30 to 50 years. We are told by experts, that persons in the teens and early twenties are most receptive to instruction. How much better could these teachers have mastered this material if it could have been presented to them when they attended college during their most receptive and productive years! It shall also be mentioned that the N. S. F. Institues are not here to stay. The conduction of such institutes in an emergency means to help us bridge over an apparent gap. Eventually it will be the responsibility of the Universities and school authorities to train teachers who do now need such additional help anymore.

Here is a choice sample of a study plan taken by a real life High School teacher, holding a teaching certificate, who is now teaching Algebra 1 and 2 and accelerated Algebra 2 and 3 in a High School in one of the Western States:

		Semester Credits
Math.	College Algebra	3 1/3*
	Solid Geometry	3 1/3*
	Trig.	3 1/3*
Biology	Introduction to Biology	3 1/3
Chemistry	General Chemistry	3 1/3
Earth Sc.	Survey Phys. Sc.	3 1/3
	SUB TOTAL	20

* No college credit is given for these courses at the University of Idaho

Education	Impr. Teach. Arith.	1 2/3	Principle of Guidance	1 2/3
	Intr. Education	2	Impr. Guidance	1 2/3
	Education Psychology	5 1/3	Impr. Arithmetic	1 2/3
	Teaching Proc.	6	Elem. School Curriculum	2 2/3
	Social Foundations of Ed.	2 2/3	Problems of Adols.	1 2/3
	Driver Education Teaching	2	Guidance and Couns.	1 2/3
	Student Teaching	10	Adv. Psychology	1 2/3
	State Manual	2/3	Public Relations	1 2/3
	Public School Adm.	1 2/3	School Finance	1 2/3
	High School Organization	1 2/3	Supervision	1 2/3
			School Finance	1 2/3
	SUB TOTAL			52

I will refrain from commenting on this curriculum and let it speak for itself.

THE ANNUAL HIGH SCHOOL MATHEMATICS CONTEST

Invitations have been sent out to all Idaho High Schools to participate in the 1962 Annual High School Mathematics Contest. This contest, as in previous years, is sponsored jointly by the Mathematical Association of America and the Society of Actuaries. The aim of the contest is to create and maintain interest in mathematics among the students of our secondary schools.

The contest chairman for the State of Idaho is Dr. Hans Sagan, Head of the Department of Mathematics at the University of Idaho. The deadline for registration is January 15, 1962. The contest will be held on Thursday, March 8, 1962.

As in past years, the Society of Sigma Xi (National Research Honor Society) at the University of Idaho will award three cash prizes in the amount of $25.00, $15.00, and $10.00 for the three winners of the 1962 contest.

Winners of last year's contest were:

1. David Harold Brick - Pocatello High School
2. Douglas W. Curtis - Moscow High School
3. John Francis Dillon - Pocatello High School

The highest team score was accomplished by Pocatello High School with Moscow High following up. 2270 students from 61 Idaho High Schools participated in last year's contest.

NATIONAL SCIENCE FOUNDATION SUMMER INSTITUTE
FOR HIGH SCHOOL TEACHERS IN MATHEMATICS

We just received word from the National Science Foundation in Washington D. C. that they are considering a grant to the University of Idaho to conduct a N.S.F. Institute for High School teachers in Mathematics. Final word will be received at the Institute Directors Meeting in San Francisco on December 15th and 16th, 1961. Dr. Hans Sagan, the director of our prospective Institute will reperesent the University of Idaho at this meeting.

If our grant should be approved, it will mean that the University of Idaho will receive $43,447.62 for the operation of an 8-week Institute which will last from June 18, 1961 to August 10, 1961. We will be in a position to grant 35 Stipends of $600.00 plus $120.00 per dependent, and also reimburse partly the travel expenses of the participants.

Two courses for 4 credits each will be offered:

N.S. Math 153--Modern Trends in High School Arithmetic and Algebra

N.S. Math 156--Modern Trends in High School Geometry

Each course consists of 5 lectures and a 2 hour seminar discussion period each week with optional laboratory facilities available to help the participants develop ingenuity in handling the more challenging problems occuring in elementary mathematics.

If our proposal meets final approval, we will send out a publicity brochure during the latter part of December. Deadline for application is February 15th and grants will be announced between March 5 and March 15, 1962.

NATIONAL SCIENCE FOUNDATION SUMMER INSTITUTE
FOR SCIENCE AND MATHEMATICS TEACHERS

Courses will be offered in the fields of Biology, Botany, Zoology, Geology, Chemistry, Physics, and Mathematics. The courses in mathematics are designed for those teachers who have had some work in the calculus. The special mathematics courses include: Algebra and Geometry for High School Teachers, Analysis and Geometry for High School Teachers, An Introduction to Some Contemporary Mathematical Concepts, History of Mathematics, Directed Readings in Mathematics, and Advanced Engineering Mathematics which is a regular mathematics department offering.

This Institute is sequential in nature and is designed for those who wish to work for an advanced degree. It is possible under this plan to complete the requirements for a Master of Natural Science degree by three summers' residence and three credits "in absentia". However, continuance in the Institute program is contigent upon receipt of N. S. F. grants by the University and the participant's success in course work.

For further information and application forms, please write to Dr. E. H. Grahn, Director, Department of Physical Sciences, University of Idaho, Moscow, Idaho.

This program is subject to final approval by the National Science Foundation.

NEWS AND NOTES

Mrs. Elna H. Grahn, Assistant Professor of Mathematics was awarded the title "Supervisor of Freshmen Mathematics" in recognition of the work she has done in the past and the duties that have been assigned to her at present and for the future.

Dr. Delmar Boyer joined our staff as Assistant Professor of Mathematics in September 1961. Dr. Boyer received his A. B. degree at Kansas Wesleyan University, his M.A. degree and his Ph. D. degree at the University of Kansas. His specialty is Abstract Algebra and he has published a number of research papers on Abelian Groups. Dr. Boyer comes to us from Fresno State College.

Dr. Shashanka Mitra was appointed as an Assistant Professor of Mathematics effective September 1, 1961. Dr. Mitra received his B. S. and M. S. degree at the University of Calcutta and most recently his Ph. D. degree from the University of Washington. His specialty is Mathematical Statistics. His thesis Sample Functions of a Stochastic Process with Stationary Independent Increments was accepted for publication in the Transactions of the American Mathematical Society, one of the worlds leading research journals in Mathematics.

We regret the loss of Dr. Antony E. Labarre, Jr., former Associate Professor of Mathematics at the University of Idaho who is now Chairman of Mathematics at Fresno State College. Many of you have known Dr. Labarre from our N. S. F. Summer Institute and his visiting lectures at many high schools of our state.

Three of our Mathematics Majors, Lewis Grigg, Earl Dean Ritchie, and Darrell Ray Turnidge will take part in this years William Lowell Putnam Competition as a team. This competition which is administered on a national scale will consist of 6 hours written examination in Mathematics to take place on December 2, 1961.

Dr. Syed Husain joined our faculty as a Visiting Assistant Professor of Mathematics for the school year 1961-62. Dr. Husain received his M. S. degree from the University of Chicago and his Ph. D. degree from Purdue University. He taught previously at the University of Saskatchewan.

Dr. Hans Sagan was promoted to Professor of Mathematics and Head of the Department of Mathematics effective September 1, 1961. Dr. Sagan joined the University of Idaho Faculty in Fall 1957 as an Associate Professor of Mathematics. From 1950 to 1954 he was on the faculty of the University of Technology in Vienna, Austria and from 1954 to 1957 on the faculty of Montana State College in Bozeman, Montana.

Miss Monika Aumann joined our faculty as a Visiting Instructor of Mathematics for the school year 1961-62. She received the equivalent of a B. S. degree from the University of Munich, Germany and her M. S. degree in Mathematics from the University of Idaho in Spring 1961. Miss Aumann is the daughter of Dr. Georg Aumann who spent the last year on our campus as a visiting professor of Mathematics.

Under the direction of Professor Ward H. Crowley from the University of Idaho, the Mathematics Departments of the University of Idaho and Washington State University are holding a joint Mathematics Colloquium every Monday at 4:15 p.m. We meet alternatingly on our campus and the Washington State University campus to listen to and discuss presentations of recent research in Mathematics by one of the faculty members. This far, Professor Ward H. Crowley (University of Idaho) Dr. Ted Ostroem (Washington State University) Dr. Syed Husain (University of Idaho) and Dr. Donald Bushaw from Washington State University have given colloquium lectures. Dr. Delmar Boyer (University of Idaho) will speak on Monday, December 4th. This colloquium is a wonderful opportunity for our graduate students to familiarize themselves with the recent developments in various areas of Mathematics.

Dr. Hans Sagan, Head of the Mathematics Department presented, upon invitation, a lecture on Approximate Methods from the Functional Analytic Standpoint at the meeting of the Northwest Section of the Society of Applied and Industrial Mathematics (SIAM) in Seattle Washington on October 21, 1961

The Mathematical Association of America and the Department of Mathematics of the University jointly sponsored the visit of Dr. Samuel Eilenberg, Professor of Mathematics and Head of the Mathematics Department of Columbia University to our campus. Dr. Eilenberg stayed with us from November 28th to December 1st and gave four lectures, two to our undergraduates and two to our graduate students and staff.

The Department of Mathematics and the University of Idaho Chapter of the Society of Sigma Xi (National Research Honorary) have invited Dr. Robert Gaskell, Professor of Mathematics at the University of Oregon, to give a number of lectures on our campus during the latter part of April 1962. Dr. Gaskell accepted our invitation.

Dr. Hans Sagan received invitations from Nampa High School, the High School in Post Falls and the Grangeville High School as part of the visiting scientist program which is sponsored by the National Science Foundation and administered by the Idaho Academy of Sciences. Dr. Elmar Raunio, Professor of Chemistry is in charge of this program.

Professor Ward H. Crowley attended the 1961 Summer Computer Conference at the University of Oklahoma from June 12 to July 5, 1961

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