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The April Meeting of the Iowa Section

The 44th regular meeting of the Iowa Section of the Mathematical Association of America was held at Iowa State Teachers College, Cedar Falls, Iowa, April 26-27, 1957. Professor Fred W. Lott, Chairman of the section presided at the April 26 afternoon session and Professor A. H. Blue, Vice-Chairman presided at the April 27 morning session.

Total attendance was 63, including 37 members of the Association.

Routine business was considered and a committee report was made on arrangements for a joint meeting with the Iowa Association of mathematics teachers.

It was moved and seconded that the Chairman should appoint a committee to study the problems of examinations (contests)-to meet with other groups interested in sponsoring the examination - - and this appointed committee to report to the Executive Committee for a decision regarding the matter. Motion carried.

It was also moved and seconded that the group express itself as being in favor of such a contest. Motion carried.

The following officers were elected:

Chairman, Professor A. H. Blue, Cornell College, Mt. Vernon, Iowa

Vice Chairman, Professor Allen T. Craig, The State University of Iowa, Iowa City, Iowa

Secretary-Treasurer, PROFESSOR Earle L. Canfield, Drake University, Des Moines, Iowa.

The following papers completed the program:

Friday afternoon, April 26.

1. Report of the committee on cooperation among college and high school teachers of mathematics,

by

Professor O. C. Kreider, Iowa State College,

Professor M. F. Smiley, State University of Iowa AND

Professor I. H. Brune, Chairman, Iowa State Teachers College,

Presented by Professor I. H. Brune.

We have made progress. Members of the Iowa Section of the Mathematical Association of America met with the Iowa Association of Mathematics Teachers on 2 November 1956. Some high school teachers met with the Iowa Section 26 April 1957. Members of both organizations have been invited to a conference on mathematics at the State University of Iowa in October 1957.

The committee recommended that members of the Iowa Section:

1. Maintain membership in the IAMT.
2. Meet whenever possible with high school teachers.
3. Contribute items for the IAMT Newsletter.
4. Speak at meetings of high school teachers.
5. Sponsor meetings for both groups of teachers.

2. A trick in solving a class of boundary value problems,

by

Professor Don Kirkham, Iowa State College

In a class of boundary value problems it is found that the solution $f(x)$ reduces to a series $\sum A_m \sin(m\pi x/b)$, $m = 1, 2, \ldots, \infty$, defined for $0 < x < a$, $a < b$, b being the length of the boundary and the A_m, coefficients to be determined. In this same type of problem the boundary condition is satisfied independently of the series for $a < x < b$ and therefore one may use the trick of setting the series equal to itself for a x b in the form $\sum A_m \sin(m\pi x/b)$ ~~(m x/)~~ $= \sum A_p \sin(p\pi x/b)$, $p = 1, 2, \ldots N$, $N \to \infty$. The A_m may now be found from a series of N simultaneous equations which arise. The trick works also for Bessel-Fourier series, etc.

3. Some "solutions" of inconsistent linear systems,

by

Professor G. E. Langenhop, Iowa State College

Let A be an n by r matrix, $n > r$, and let c and x be n and r dimensional column vectors, respectively. The system (1) $Ax = c$ is generally inconsistent. The least squares solution, $\bar{x}$, must satisfy $A'Ax = A'c$ (B' = transpose of B), which is always consistent. Let (2) $A_i x = c_i$ denote a system of r equations from (1) and denote the solution of (2) by $x^{(i)}$ if it exists. Then if A has rank r it was shown that $\bar{x} = |A'A|^{-1} \sum_i |A_i|^2 x^{(i)}$, where $|B|$ = determinant of B and the sum is over all distinct systems (2), the summand being interpreted as a zero if $|A_i| = 0$. Various extensions of this relation were also presented.

4. Filters and equivalent nets,

by

Professor M. F. Smiley, State University of Iowa.

This presentation was an attempt to convey the essential technical idea in pedagogical terms by proposing the question as to which of the nets, Basic Mathematical Concepts or Basic Mathematical Skills, is the finer one to catch college freshman.

5. The cardinal number of residual sets,

by

Professor Uno R. Kodres, Iowa State College, introduced by the chairman.

An elementary construction is used to prove the known result that every residual set has the cardinal number of the continuum.

6. Remarks on the convolution of real functions in Laplace transform theory,

by

Professor C. G. Maple and Professor B. Vinograde, Iowa State College, presented by Professor B. Vinograde.

A real function is of class T if it is 1) of exponential order and 2) sectionally continuous except for a possible infinite discontinuity of order t^{-a}, $(0 < a < 1)$, at $t = 0$. It is shown that functions of class T possess absolutely convergent Laplace transforms and furthermore the convolution of two functions of class T is also of class T.

7. Mathematical training for the exceptional student,

by

Professor Fred Robertson, Iowa State College

The author discusses the program in mathematics for these students as conducted at the Iowa State College since 1946.

Tables showing accomplishments in some lines are given. Some results and evaluations of the program are obtained.

8. An analysis of error in the learning of algebra,

by

Professor Vivian Strand and Professor David A. Yos,

Burlington High School and College , presented by Professor David A. Yos, introduced by the chairman.

The errors which learners of mathematics make are a clue to their thoughts. Some of the more common of these errors have been listed and described. The erratic pattern of error, common errors in addition and division, errors in the addition of unlike fractions, and the compounding of error in the solution of simultaneous equations are treated. The psychology of fear is considered to be a very important factor in initiating these errors.

9. A remark on a certain sufficient statistic,

by

Allen T. Craig, University of Iowa

In a regular case of estimation, let X denote a continuous type random variable having probability density function $f(x;\theta) = \exp\left[p(\theta)K(x) + S(x) + q(\theta)\right]$. Let $Y = K(X)$. It is proved that $E(Y) = b + cp(\theta)$, $c>0$, is both necessary and sufficient for Y to be normally distributed. Hence if $X_1, \ldots, X_n$ denote a random sample of $n > 1$ values of X, then $Z = \sum_i K(X_i)$ is a sufficient statistic for θ and Z will be normally distributed if and only if Y is normally distributed.

10. On quadratic forms whose distributions are free of the population mean,

by

Professor Robert V. Hogg, State University of Iowa

Let $Q_1, Q_2, \ldots, Q_k$ be k non-negative real symmetric quadratic forms in n random values of a normally distributed variable with mean m. A necessary and sufficient condition that each Q_i, $i = 1, 2, \ldots, k$, has a distribution free of m is that their sum $Q = \sum_1^k Q_i$ has this property.

Saturday, April 27

11. A modern approach to elementary analysis

by

Professor H. C. Trimble, Iowa State Teachers College

(By invitation)

While mathematics has grown up in the past one-hundred and fifty years, the mathematics taught to high school pupils and college freshmen is seldom more modern than Euler. Experience at Iowa State Teachers College suggests that portions of modern mathematics are teachable. Ninth graders assimilate modern ideas of variable, unknown, parameter, relation, function, and the like readily. College freshmen resist these ideas for a time, and then progress rapidly. Is it true that "mathematics is teachable just in case it is good mathematics"?