43rd Regular Meeting of the Iowa Section

The 43rd regular meeting of the Iowa Section of the Mathematical Association of America was held at Grinnell College, Grinnell, Iowa on April 20-21, 1956

The attendance was 55, including 29 members of the Association.

The following officers were elected:
Chairman, Prof Fred W. Lott - Iowa State Teachers College
Cedar Falls, Iowa
Vice-Chairman, Prof. A. H. Blue - Cornell College Mt. Vernon, Ia.
and Secretary-Treasurer, Earle L. Canfield - Drake Des Moines, Ia.

Prof. Smiley made the following motion:

WHEREAS, the cooperation of the high-school and college teachers of mathematics in Iowa is deemed to be of vital concern to the members of the Iowa Section of the Mathematical Association of America.

NOW THEREFORE, BE IT RESOLVED that the Iowa Section of the Mathematical Association of America hold, each year, a meeting in addition to the annual Spring meeting to be devoted to the pedagogic interests of collegiate mathematics and held in conjunction with a meeting attended by large numbers of Iowa high-school teachers of mathematics.

The discussion focused on the desireability of and what was involved in the proposed meeting.

The motion carried unanimously.

The following papers were presented:

1. "Pascal's Arithmetical Triangle", by Prof. R.B. McClenon.
Professor McClenon presented Pascal's construction of the Arithmetical Triangle, and several theorems which Pascal proved by mathematical induction. It was pointed out that they, as well as the well-known applications which Pascal made, could be proved easily by using modern notation.

2. "An application of the functional equation $f(x+y) = f(x)f(y)$ in elementary differential equations", by L. E. Pursell, Grinnell College and R. F. Reeves, Ohio State University.

It is well known that if $y(x)$ satisfies the differential equation $dy/dx = ky$, then $r(x) = y(x)/y(0) = \exp(kx)$ satisfies the functional equation $r(x_1+x_2) = r(x_1)r(x_2)$ and conversely if $r(x)$ is differentiable at $x = 0$ and satisfies this functional equation, then for any choice of $y(0)$ the function $y(x) = y(0)r(x)$ satisfies the differential equation $dy/dx = |r'(0)|y$. In some classroom applications in which this differential equation is involved, it is more convincing to the students to demonstrate first that the functional equation is satisfied. The window problem as given in section 3.3 of Differential Equations by Agnew is solved as an example.

3. "Common elements", by F. A. Brandner, Iowa State College.

A rigorous and complete treatment of the subject, "Common Elements", is not to be found in any text-book of statistics, and almost no research has been done in that direction. Several definitions and their equivalence are discussed. The elementary idea is extended. Properties of common elements equations and their possible uses are developed.

4. "Charts for zeros of cross product Bessel Functions", by Don Kirkham, Iowa State College.

In an earlier report (this MONTHLY, vol. 59, p. 501, 1952) some methods for obtaining the zeros of $J_n(x_p)Y_m(kx_p) - J_m(kx_p)Y_n(x_p)$ and for some similar cross products having the inner pair of terms, or all four terms primed (differentiated), were presented. Now, utilizing these methods, a series of large graphs (charts) of x vs. kx, from which the zeros of the cross products, with and without the primes, for $n = m = 0, 1, 2, 3$, $p = 1, 2, \ldots 9$, $0 \leq k \leq \infty$, $k = 1$ excluded, can be read to about two decimal accuracy, has been prepared. The zeros of $J_n(x)$ and of $J_n'(x)$ lie on the graphs and are seen to be closely enough disposed to enable one to draw, to about two decimal accuracy, except for x or kx near zero, graphs of x vs. kx from a set of zeros of $J_n(x)$ and/or of $J_n'(x)$ alone. Zeros of $Y_n(x)$ and of $Y_n'(x)$ also lie on the graphs and are identified. The charts are of further particular interest in that they provide approximate values of x_p for large k, values which are not tabulated in the literature; show clearly that a zero of the cross products exist at $k = \infty$ and $k = 0$ and show that a zero at $k = \infty$ or $k = 0$ is a zero of either $J_n(x)$ or of $J_n'(x)$.

5. "History of the first 40 years of the Iowa Section of the Mathematical Association of America", by Fred Robertson, Iowa State College.

The author discussed the formation of the section on April 28, 1916 in Des Moines. The names of the charter members were given.

The minutes of the first meetings were reviewed. The fact that the section has met jointly with the Iowa Academy of Science since its founding and met with the State Teachers Association for the first five years of its existence was emphasized in the discussion of time, place of its meetings.

Changes over the years were shown and hopes for future progress expressed.

6. "Remarks on commuting automorphisms of rings", by M. F. Smiley, State University of Iowa.

Nathan Divinsky (Trans. Royal Soc. Canada, Sect. III, (3), 49 (1955), 19-22 discusses automorphisms T of an associative ring A which satisfy $x \cdot x^T = x^T \cdot x$ for every x in A. The present note frees this discussion from the chain condition employed by Divinsky by using results of the Jacobson structure theory of rings.

7. "A characterization of a certain type of distribution", by R. V. Hogg, State University of Iowa.

Let F(x) denote the c.d.f. of a random variable x and $G_n(\overline{x})$ that of the arithmetic mean $\overline{x}$ of a random sample of n values of x. It is well known that if E(x) = is finite, the sequence of distributions $G_n(\overline{x})$ converges to the distribution

$$G(\overline{x}) = 0, \ \overline{x} < \ , \qquad = 1, \ \overline{x} \geq \ ;$$

in every continuity point of $G(\overline{x})$. If E(x) does not exist, little is known concerning the limit of the sequence $G_n(\overline{x})$.

For the class of distributions having $F(x) = \int_{-\infty}^{x} \frac{cy^{2(p-1)}}{(1+y^2)^p}\, dy$,

p a positive integer, it is proved that the sequence of distributions $G_n(x)$ converges to the distribution

$$G(\overline{x}) = \frac{1}{\pi} \int_{-\infty}^{\overline{x}} \frac{K}{(K_2+t_2)}\, dt.$$