MATHEMATICS

Chairman: Paul Overman, Purdue University

W. H. Carnahan, Purdue University, was elected chairman for 1950.

ABSTRACTS

Sampling Distribution for Medians from a certain general Population. I. W. Burr, Purdue University.—Given the cumulative frequency function $F(x)=1-1/(1+X^c)^k$, the exact sampling distribution of the medians, Z, for a sample of $N=2n+1$ cases is:

$$\frac{N!}{(n!)^2}\left[1-\frac{1}{(1+z^c)^k}\right]^n \frac{ck\,Z^{c-1}}{(1+z^c)^{nk+k+1}}$$

Moments are readily obtained and it is possible to compare the efficiency of the mean and median for strongly skewed and J-shaped frequency curves as well as more "normal" ones.

Einstein's proof of the equivalence of mass and energy. Walter H. Carnahan, Purdue University.—Making use of two well-known laws from elementary physics and high school algebra Einstein established the formula $E=mc^2$ as the equivalence relation between mass and energy. The paper reviewed the steps in Einstein's development, giving full details so that any person with only a good high school education could follow the reasoning.

Note on the solution of the special case of the non-homogeneous first order and first degree differential equation by means of an integrating factor. Will E. Edington, DePauw University.—The solution of the special case of the non-homogeneous first order and first degree differential equation by means of an integrating factor is of interest pedagogically because this equation is no longer considered as an exceptional case requiring special methods of solution.

Solution of

$$X^2\frac{d^2y}{dx^2}+KX\frac{dy}{dx}+(X^2-n^2)y=0$$

in terms of Bessel functions. Robert R. Hare, Indiana University.—The solution of the differential equation

$$X^2\frac{d^2y}{dx^2}+KX\frac{dy}{dx}+(X^2-n^2)y=0,$$

k and n being constant real values, may be expressed in terms of Bessel functions as

$$y = X^{(1-K)/2}[C_1 J_q(X) + C_2 J_{-q}(X)]$$

when q is not an integer, and

$$y = X^{(1-K)/2}[C_1 J_q(X) + C_3 Y_q(X)$$

when q is an integer. q is defined as $\sqrt{(K-1)^2+4n^2}/2$; $J_q(X)$, $J_{-q}(X)$, and $Y_q(X)$ are Bessel Functions; C_1, C_2, and C_3 are arbitrary constants.

The differential equation is transformed into the Bessel equation

$$X^2 \frac{d^2u}{dx^2} + X \frac{du}{dx} + (X^2 - q^2)u = 0$$

by means of the substitution $y = ux^{(1-K)/2}$, where q is defined as above.

Mathematics in present day Europe. DR. J. KOREVAAR, Purdue University.—The War has given a great impetus to the study of Applied Mathematics in Europe. Governments are eager to subsidize research in this particular field. This paper perhaps deals more with the situation in Holland than is consistent with Holland's significance, but on the other hand the development in Holland since the war is typical for many countries in Europe.

An Experiment in Sampling from a Pearson Type III Distribution. LOIS JEAN NIEMANN.—Samples of four were taken from a Pearson Type III population of $\alpha_3 = 1.1$. Distributions of the means, medians, standard deviations, mean deviations, and ranges of the samples were compared with those from a normal population. Also calculated were eight correlations between the above mentioned statistics.

The Epistemic Correlation. J. CRAWFORD POLLEY, Wabash College.—A discussion of mathematical induction and the total differential equation as illustrative of F. C. S. Northrop's theory on knowledge. The author shows how the two mathematical theories may be so interpreted as to satisfy the conditions relative to what Northrop calls the "aesthetic component" and the "theoretic component" of knowledge, and the "epistemic correlation" which connects them.

The History of Calculus. ARTHUR ROSENTHAL, Purdue University.—This lecture discusses the development of the ideas leading to Calculus, from Archimedes to Newton and Leibniz, and in particular the role of the predecessors of Newton and Leibniz.