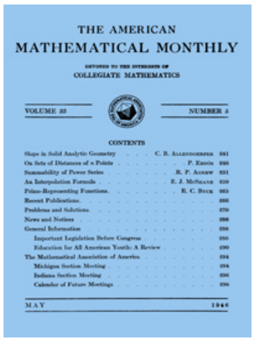

The American Mathematical Monthly

ISSN: 0002-9890 (Print) 1930-0972 (Online) Journal homepage: https://maa.tandfonline.com/loi/uamm20

The Fall Meeting of the Indiana Section

M. W. Keller (Secretary)

To cite this article: M. W. Keller (Secretary) (1946) The Fall Meeting of the Indiana Section, The American Mathematical Monthly, 53:5, 296-298, DOI: 10.1080/00029890.1946.11991684

To link to this article: https://doi.org/10.1080/00029890.1946.11991684

Published online: 11 Apr 2018.

Professor Frame discussed the determination of cubic surfaces having 27 distinct real lines with coördinates rational in some projective system. By choosing the coördinate planes and the unit plane as the tritangent planes to the surfaces, the equation in projective coördinates (x_1, x_2, x_3, x_4) becomes $x_0x_2x_4 = x_1x_3x_5$ where

$$x_0 + x_1 + x_2 + x_3 + x_4 = a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 = 0,$$

and in which $a_1, \cdots, a_5$ are homogeneous parameters. A plane $\rho x_0 = a_5x_5$ will be tritangent only when ρ is one of the roots λ, μ, ν of the cubic

$$\rho(\rho - a_2)(\rho - a_4) = a_5(\rho - a_1)(\rho - a_3).$$

If we let

$$\xi_0 = \rho x_0, \quad \xi_5 = -a_5x_5, \quad \xi_i = (\rho - a_i)x_i, \quad i = 1, 2, 3, 4$$

we may write the equation of the surface in the form

$$\xi_0\xi_2\xi_4 + \xi_1\xi_3\xi_5 = 0$$

or in any one of the 27 forms obtained from

$$\xi_0(\xi_2 + \xi_1)(\xi_4 + \xi_1) + \xi_1(\xi_3 + \xi_0)(\xi_5 + \xi_0) = 0$$

by letting ρ be λ, μ, ν, and permuting the subscripts 0, 2, 4 and 1, 3, 5 respectively. The first equation displays the nine lines of the form $\xi_0 = \xi_1$, and the second displays the eighteen lines of the form

$$\xi_0 + \xi_1 = \xi_2 + \xi_3 = \xi_4 + \xi_5 = 0.$$

For these lines to be rational we must have the a_i and λ, μ, ν all rational. To accomplish this, assign integral values to a_1, λ, μ, ν, compute the number

$$F = \frac{1}{a_1}(a_1 - \lambda)(a_1 - \mu)(a_1 - \nu) = (a_1 - a_2)(a_1 - a_4)$$

and let $a_2 - a_1$ be any factor R of F. Then

$$a_2 = a_1 + R, \quad a_4 = a_1 + \frac{F}{R}, \quad a_5 = \lambda + \mu + \nu - a_2 - a_4, \quad a_3 = \frac{\lambda\mu\nu}{a_1a_5}\cdot$$

For the 27 lines to be distinct we exclude cases in which a_2 or a_4 is equal to λ, μ, ν. An example of a surface with 27 distinct rational lines is

$$(x_1 + x_2 + x_3 + x_4)x_2x_4 - x_1x_3(2x_1 + 3x_2 + 15x_3 + 8x_4).$$

8. *Sum of the distances to sides of a triangle*, by D. K. Kazarinoff, University of Michigan, introduced by the Secretary.

C. J. COE, *Secretary*

THE FALL MEETING OF THE INDIANA SECTION

The twenty-third annual meeting of the Indiana Section of the Mathematical Association of America was held at Butler University, Indianapolis, Indiana, on Friday, October 19, 1945, in conjunction with the fall meeting of the Indiana Academy of Science. Professor Juna L. Beal presided.

Thirty-three persons registered at the meeting, including the following twenty-one members of the Association: G. E. Albert, W. L. Ayres, Juna L. Beal, Stanley Bolks, I. W. Burr, W. E. Edington, G. H. Graves, Cora B. Hennel, H. K. Hughes, M. W. Keller, E. L. Klinger, H. A. Meyer, A. N. Milgram, G. T. Miller, Ivan Niven, P. M. Pepper, C. K. Robbins, T. Y. Thomas, M. S. Webster, H. E. Wolfe.

At the business meeting the following officers were elected for the next year: Chairman, W. L. Ayres, Purdue University; Vice-Chairman, G. H. Graves, Purdue University; Secretary-Treasurer, M. W. Keller, Purdue University. It was decided to hold the next annual meeting again in conjunction with the Indiana Academy of Science.

The following papers were presented:

1. *A practical form of the comparison test for series of positive terms*, by Professor H. K. Hughes, Purdue University.

Let $\sum u_n$ and $\sum v_n$ be two infinite series of positive terms. If $\lim_{n\to\infty}(u_n/v_n)=L$, where L is a positive number, then it is well known that the two series are both convergent or both divergent. This modified form of the usual comparison test has not been much used in classes studying series for the first time, but it actually is very practical. The speaker cited examples of series for which a young student might have difficulty in setting up a "comparison series" but which could be handled easily by the test in the form here described.

2. *Statistical methods for controlling the quality of industrial products*, by Professor I. W. Burr, Purdue University.

Since industrial data are statistical in nature, it is only to be expected that they may best be analyzed by statistical methods. In this connection the concepts of frequency distribution, control charts, correlation, and probability are especially useful. It was the purpose of this paper to show how these tools are used in the practical applications, to suggest this field as a new and attractive career, and to point out that there are many unsolved problems.

3. *A program for increasing interest in mathematics in Indiana high schools*, by Professor W. H. Carnahan, Purdue University, introduced by M. W. Keller.

The speaker illustrated by various devices the manner in which he attempts to interest high school students in mathematics by showing them the part it plays in their daily lives.

4. *On length of curves*, by Professor A. N. Milgram, University of Notre Dame.

Let R be a plane region bounded by a simple closed curve J. We say that R bends toward the region at the point $P\subset J$ if there exist arbitrarily small segments in R with endpoints A and B on J in the order APB on a "small" sub arc of J. *Every simple closed curve has at least three points at which the curve bends toward the region.* This may be used to prove that in any closed region which is simply connected two interior points have a unique geodesic joining them. A simple closed curve J of finite length L has in any ϵ neighborhood a curve interior to J of length $L^* < L$, and exterior to J a curve of length $L^* < L+\epsilon$.

5. *Absolute scalar invariants and the isometric correspondence of Riemann spaces*, by Professor T. Y. Thomas, Indiana University.

Necessary and sufficient conditions for the isometric correspondence of Riemann spaces R_n and $\bar{R}_n$ are given in terms of the equality of absolute scalar invariants of the spaces. In the general case for which the spaces admit a complete set of n functionally independent scalars, it is proved that these and a certain derived set of scalars suffice for the solution of the problem. The solution of the corresponding problem is given for spaces of two dimensions which do not admit two functionally independent scalars.

6. *Symmetry in metric spaces*, by Professor P. M. Pepper, University of Notre Dame.

In an abstract metric space S, a point c is called a *center of pointwise symmetry* if for each x in S there exists a point $y(x)$ such that the distance xc is equal to the distance $cy(x)$ and one half the distance $xy(x)$. If S has at least two centers of pointwise symmetry, then S is unbounded. A point c of S is called a *center of η-symmetry* (fractional symmetry) if $0 < \eta \leqq 1$, and for each x in S there exists a point $y(x)$ for which $xc = cy(x)$ and $xy(x) \geqq 2\eta xc$. For each positive η less than 1 there exist bounded metric spaces of arbitrarily small diameter with two centers of η-symmetry. (Examples related to the Chebychef polynomials of the second kind are shown for each η less than 1.) A point c of S is called a *center of pointwise open symmetry* if for each number $\eta > 0$ and each x in S there exists a point $y(\eta, x)$ such that $xy(\eta, x) \geq 2xc - n$ and $|cy(\eta, x) - xc| \leqq \eta$.

M. W. KELLER, *Secretary*

CALENDAR OF FUTURE MEETINGS

Twenty-eighth Summer Meeting, Ithaca, New York, August 19–20, 1946.

The following is a list of the Sections of the Association with dates of future meetings so far as they have been reported to the Secretary.

ALLEGHENY MOUNTAIN, Pittsburgh, Pa., October, 1946
ILLINOIS, Peoria, May 9–10, 1947
INDIANA, Terre Haute, October 18, 1946
IOWA
KANSAS
KENTUCKY
LOUISIANA-MISSISSIPPI
MARYLAND-DISTRICT OF COLUMBIA-VIRGINIA
METROPOLITAN NEW YORK
MICHIGAN
MINNESOTA
MISSOURI
NEBRASKA
NORTHERN CALIFORNIA, San Francisco, January 25, 1947
OHIO, Columbus, April 3, 1947
OKLAHOMA
PACIFIC NORTHWEST
PHILADELPHIA, Philadelphia, November 30, 1946
ROCKY MOUNTAIN
SOUTHEASTERN
SOUTHERN CALIFORNIA, Claremont, March 8, 1947
SOUTHWESTERN
TEXAS
UPPER NEW YORK STATE
WISCONSIN