Abstract

The abstract should be in the form of a brief and concise statement of the main results or points of view of the paper, without demonstrations and with a minimum of formulae. It should not exceed 100 words and should be compressed, if possible, into a single paragraph. It should be written in the third person. The abstract should be typewritten and in a form suitable for immediate publication in the MONTHLY.

Differentiable Integrals and Discontinuous Integrands

by

George Bridgman

One version of the Fundamental Theorem of Calculus states that if f is Riemann integrable on $[a, b]$, if f is continuous at x_0, and if

$$F(x) = \int_a^x f(t)\, dt, \quad \text{then} \quad F'(x_0) \text{ exists and equals}$$

$f(x_0)$. This paper discusses the differentiability of the integral F at a point x_0 where the integrand f is discontinuous. If f has a removable discontinuity at x_0, then $F'(x_0)$ exists, while for a jump discontinuity, $F'(x_0)$ does not exist. If the discontinuity is of neither type, then $F'(x_0)$ may or may not exist, and this paper presents examples illustrating each possibility.

Title of Paper: Differentiable Integrals and Discontinuous Integrands

Time 20 minutes.

Name of Author: George Bridgman

Institution: Wartburg College

Address: Math Dept, Wartburg College
Waverly, Iowa 50677

Member of the Mathematical Association of America: yes [X] no [ ]