

Title : Sahoo- and Wayment-type integral mean value theorems

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## ABSTRACT

The integral mean value theorem states that if  $f$  is a real-valued function that is continuous on the closed interval  $[a,b]$  and differentiable on the open interval  $(a,b)$ , then there exists a point  $c \in (a,b)$  such that  $f(c) = \frac{\int_a^b f(s)ds}{b-a}$ . The proof applies Rolle's Theorem and the fundamental theorem of calculus. The objective of this independent study is to extend the Sahoo- and Wayment-type integral mean value theorems to functions in class  $\mathcal{F}$ , which are continuous on the open interval  $(a,b)$  and possess limits at the endpoints but are not necessarily continuous on the closed interval.

This study investigates several integral mean value theorems for functions in the class  $\mathcal{F}$ , together with illustrative examples. In the proofs, auxiliary functions are constructed and important mean value theorems are applied, along with the fundamental theorem of calculus and Leibniz's rule, to determine a point  $c \in (a,b)$  at which the function value is related to the integral mean value.

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