Topic: Intermediate value theorem

Question: Use the definition of the Intermediate Value Theorem to write an inequality that represents the root of the function on the given interval.

$f(x)$ on the interval $[a, b]$

Answer choices:

A $f(a) \leq 0 \leq f(b)$

B $f(a) > 0 > f(b)$

C $f(a) \geq 0 \geq f(b)$

D $f(a) < 0 < f(b)$

Solution: D

The Intermediate Value Theorem states that, for any function $f(x)$ that's continuous on an interval $[a, b]$, if that function has a root in the interval (crosses the x-axis), then we can define the relationship between the endpoints as

$$f(a) < 0 < f(b)$$

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Question: Is the Intermediate Value Theorem valid for both open and closed intervals?

Answer choices:

A   It's valid for closed intervals only.

B   It's valid for open intervals only.

C   It's valid for both open and closed intervals.

D   An interval isn't necessary for the Intermediate Value Theorem.

Solution: A

The Intermediate Value Theorem requires that the function be continuous on the entire interval in order to be valid. This means that the Intermediate Value Theorem only works for closed intervals.