

Intermediate Value Theorem

An important property of continuous functions is that their graphs do not have any holes or jumps.

Intermediate Value Theorem

Suppose that f is continuous on the closed interval $[a, b]$ and let N be any number between $f(a)$ and $f(b)$, where $f(a) \neq f(b)$. Then there exists a number c in (a, b) such that $f(c) = N$.

Example 1.

Show that there is a root of the following equation between 1 and 2.

$$4x^3 - 6x^2 + 3x - 2 = 0$$

An Application of the Intermediate Value Theorem

We can use the Intermediate Value Theorem to determine where a function is positive and where it is negative.

Partition Numbers

For a function f a **partition number** is a number a where either

1. $f(a) = 0$ or
2. f is discontinuous at a .

Example 2.

Determine the intervals on which the following function is positive and intervals on which it is negative.

$$f(x) = \frac{x^2 - 2x - 3}{x - 1}$$