

Intermediate Value Theorem (IVT)

If we know that

- 1) $f(x)$ is continuous for all $x \in [a, b]$;
- 2) L is between $f(a)$ and $f(b)$

then what can we conclude? Draw a picture to illustrate your conclusion.

Prove that $f(x) = x^3 - 2x + 3$ has a zero between $x = -2$ and $x = 0$.

Prove $\tan^{-1}(x) = \cos^{-1}(x)$ has a solution. Hint: let $f(x)$ equal the difference of the functions.

True or False? If the only zeroes of a continuous function $g(x)$ are $g(1) = 0$ and $g(3) = 0$, and if $g(2) = -3$, then $g(x) < 0$ if $x \in (1, 3)$. Defend your answer.