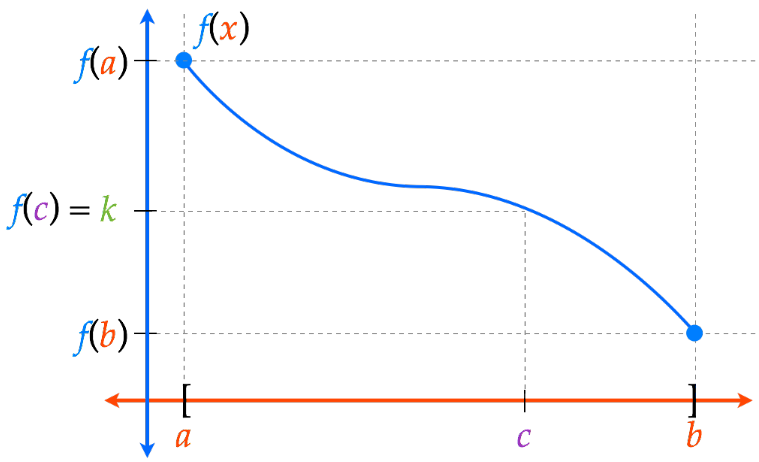
Intermediate Value Theorem

Name ______________________

Date ____________ Period _____

If function, $f(x)$, is continuous on the closed interval $[a,b]$ and k is any number between $f(a)$ and $f(b)$, then there is at least one number c in $[a,b]$ such that…

$$f(c) = k.$$



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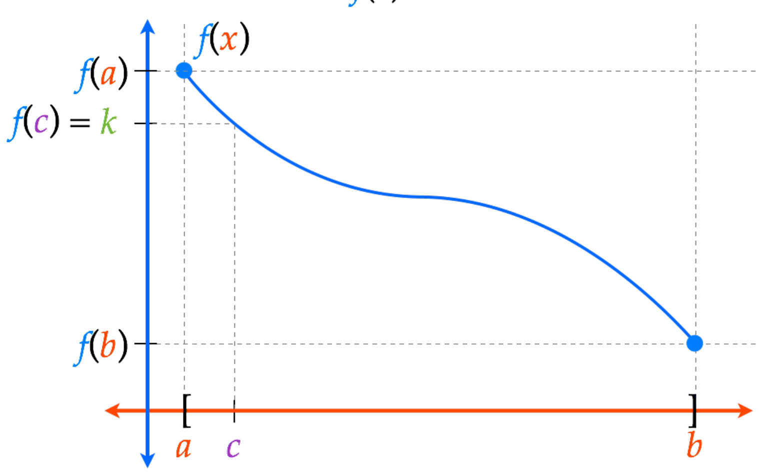

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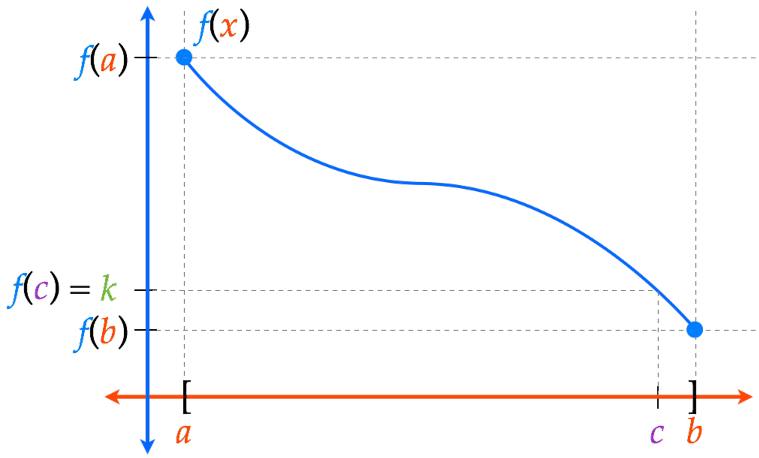

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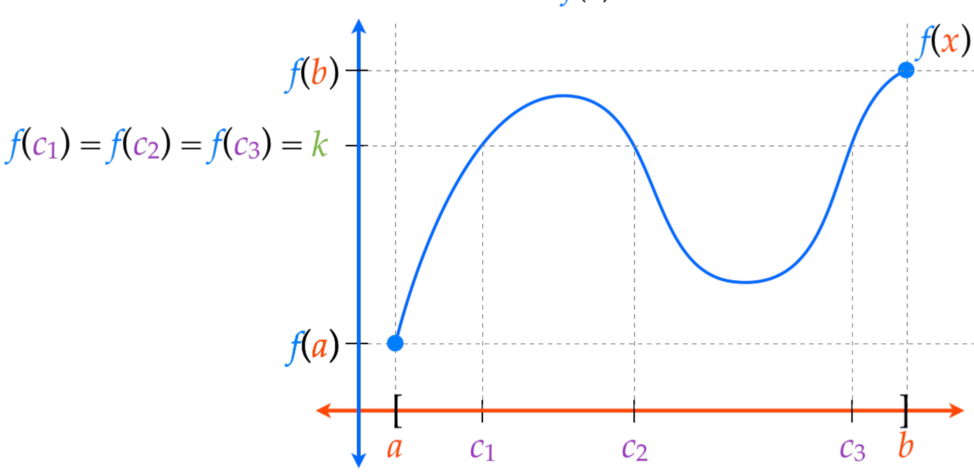
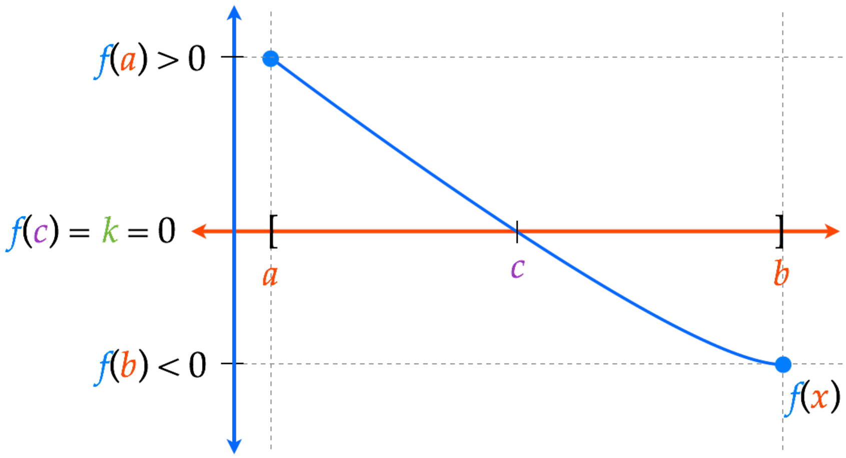


We can use the Intermediate Value Theorem to help locate zeros of a function

The zero of a function is where $f(x)$ crosses x-axis, $f(c) = 0$.



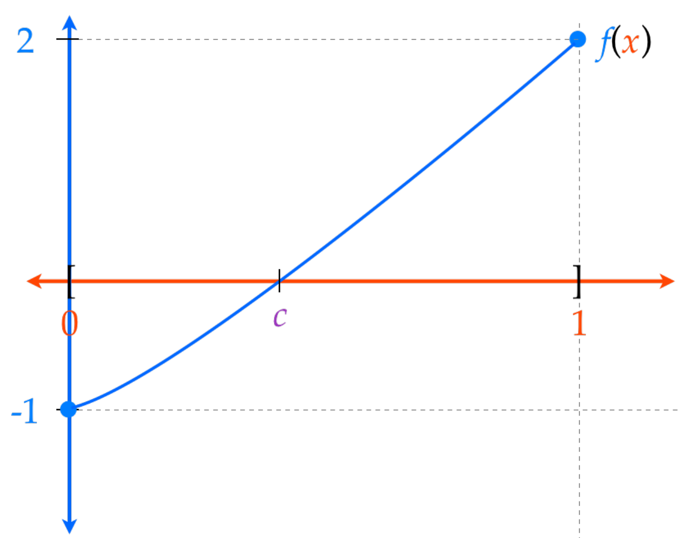
Show $f(x) = x^3 + 2x - 1$ has a zero in the interval [0,1]

Interval [0,1]

$f(0) = 0^3 + 2(0) - 1 = -1$

$f(1) = 1^3 + 2(1) - 1 = 2$

since $f(0) = -1$ and $f(1) = 2$ there must be at least one value of c in [0,1] such that $f(c) = 0$



Show $f(x) = -x^2 + 5 - \sin x$ has a zero in the interval $[0,\pi]$

Interval $[0,\pi]$

$f(0) = -(0)^2 + 5 - \sin 0 = 5$

$f(\pi) = -(\pi)^2 + 5 - \sin \pi \approx -4.7$

since $f(0) = 5$ and $f(\pi) \approx -4.7$ there must be at least one value of c in $[0,\pi]$ such that $f(c) = 0$