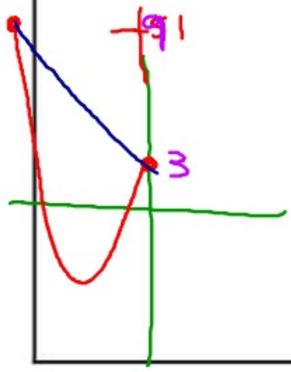
	Graph the function in a viewing window that shows all of its x-intercepts and approximate all of its zeros. A) $f(x) = x^3 - 3x^2 - 18x + 40$ B) $f(x) = -x^4 + 4x^3 - 5x^2 + 2x$
Page 20 In Varsity Learning they set the equation = 0 zeros: factors: cubic fct:	Using only algebra, find a cubic function with the given zeros. A) 2, - 4, 5 $x=2 \quad x=-4 \quad x=5$ $\boxed{(x-2)(x+4)}(x-5)$ $(x^2+4x-2x-8)(x-5)$ $(x^2+2x-8)(x-5)$ $x^3+2x^2-8x-5x^2-10x+40$ B) $\sqrt{2}, -\sqrt{2}, 3$ $x=\sqrt{2} \quad x=-\sqrt{2} \quad x=3$ $(x-\sqrt{2})(x+\sqrt{2})(x-3)$ $(x^2+x\sqrt{2}-x\sqrt{2}-2)$ $(x^2-2)(x-3)$ $x^3-3x^2-2x+6=y$ ~~Zoom to uncover Hidden Behavior~~ ~~A) $f(x) = x^4 + .1x^3 - 6.5x^2 + 7.9x - 2.4$~~ $\boxed{y=x^3-3x^2-18x+40}$ VL → $\boxed{0=x^3-3x^2-18x+40}$

Using the IVT to determine of a function has a zero on a given interval

If f(a) < 0 and f(b) > 0 we can conclude there is at least one zero in the interval [a,b]

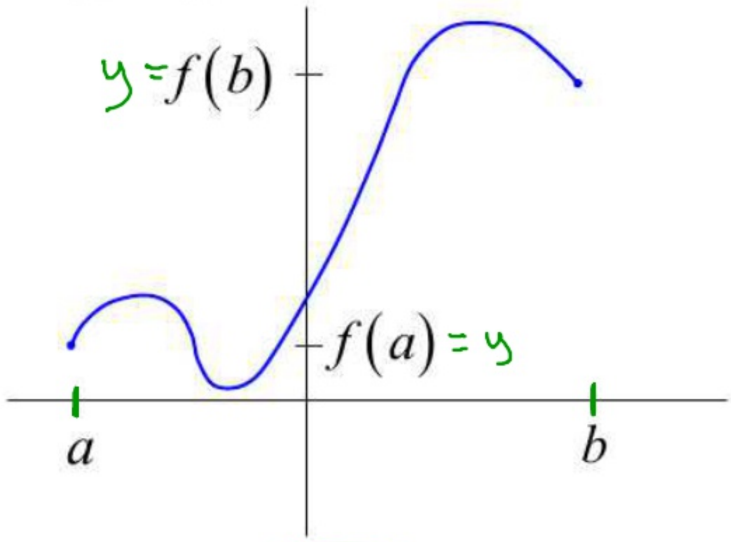
Or

If f(a) > 0 and f(b) < 0 we can conclude there is at least one zero in the interval [a,b]



Intermediate Value Theorem:

If a function is continuous between a and b, then ~~it~~ the function takes on every value between f(a) and f(b)



Because the function is continuous, it must take on every y value between f(a) and f(b)

1. Determine if $f(x) = 3x^2 + 4x - 4$ crosses the x-axis between x = -5 and x = 0.

$f(-5) = 3(-5)^2 + 4(-5) - 4 = 75 - 20 - 4 = 51$ $(-5, 51)$ a f(a)

$f(0) = -4$ $(0, -4)$ b

Since $f(-5) > 0$ and $f(0) < 0$ we can conclude that there is at least one zero from $[-5, 0]$

2. Determine if $f(x) = 3x^2 + 4x - 4$ crosses the x-axis between x = 1 and x = 5.

$f(1) = 3$

$f(5) = 3(5)^2 + 4(5) - 4 = 91$

Cannot Conclude ~~No~~, because $f(1) > 0$ and $f(5) > 0$ thus the y-values are only guaranteed to be between 3 and 91.