Calculus AB

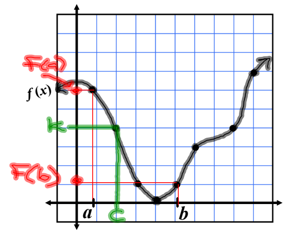
1-4

(Day 2)

Intermediate Value Theorem

Intermediate Value Theorem -

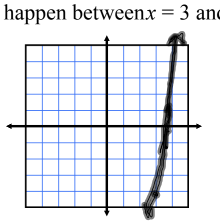
If a function f is continuous on $[a, b]$ and $k \in [f(a), f(b)]$, then there exists a number $c \in [a, b]$ such that $f(c) = k$.



Where will we ever use this? (We already have! In Alg II...)

Suppose we have the continuous function $y = \frac{1}{4}x^3 - 11$ and $f(3) = -4.25$ and $f(4) = 5$. What can I assume must happen between $x = 3$ and $x = 4$?

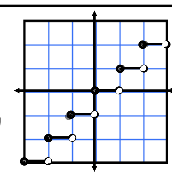
There must be a zero of the function



Greatest Integer function -

$f(x) = [\![x]\!]$

(3, 3)
(1, 1) (1.1, 1)
(2, 2) (1.9, 1)
(-1.1, -2)



$\lim_{x \to 2^+} f(x) =$ 2

$\lim_{x \to 2^-} f(x) =$ 1

$\lim_{x \to 2} f(x) =$ $\varnothing$

How do we get this on the graphing calculator?

$y_1 =$ int(x)

Describe the continuity of $f(x)$.

Nonremovable at $\mathbb{Z}$

Find the limit (if it exists). If it does not, explain why. (pg 79)

old book 21) $\lim_{x \to 4^-} \left(3[\![x]\!] - 5\right)$

$3[\![3.9]\!] - 5$

$3(3) - 5$

$\boxed{4}$

Explain why the function has a zero in the specified interval.

84) $f(x) = x^3 + 5x - 3,\ [0, 1]$

$F(0) = -3$

$F(1) = 3$

must be a zero between -3 & 3 because f(x) is continous.

Verify that the Intermediate Value Theorem applies to the indicated interval and find the value of c guaranteed by the theorem.

92) $f(x) = x^2 - 6x + 8$, $[\overset{a}{0}, \overset{b}{3}]$, $f(c) = \overset{k}{0}$

$F(a) = F(0) = 8$

$F(b) = F(3) = -1$

$F(c) = 0 = x^2 - 6x + 8$

$0 = (x-4)(x-2)$

$\{4, 2\}$

$\boxed{c = 2}$ between $[0, 3]$

Assignment:

Pg. 79

23 - 26 all,

59, 60,

63 - 71 odd,

77 - 80 all,

83, 91, 93,

95 - 97 all,

107, 114