Good afternoon

Have hw out when bell rings, we will check over it then have a mini lesson ahead of class.

will need textbook during class today

Reminders: assessment Friday! more deets in class

HW

39. continuous everywhere except x=2 and -2 (both inf)
42. continuous everywhere
45. continuous everywhere
48. continuous everywhere except x=-2 (rem) and 3 (inf)
51. continous everywhere
54. continous everywhere except x=2 (jump)
57. continuous everywhere except x=$\frac{\pi n}{2}$, n is an integer (inf)

$$\frac{x+2}{x^2-x-6} = \frac{x+2}{(x-3)(x+2)} = \frac{1}{x-3}$$

$$f(x) = \csc(2x) = \frac{1}{\sin(2x)}$$

$\theta = 2x$

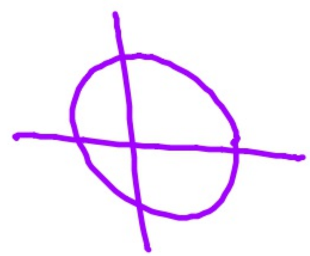
$\sin(2x) = 0$?

$\sin(\theta) = 0$

$\theta = \pi \cdot n$

$2x = \pi n$

$x = \frac{\pi n}{2}$



Making a function continuous

NOTES

Find the value of *a* so that *f(x)* is continuous everywhere

$$f(x) = \begin{cases} 2x+5 & x \le 1 \\ ax+2 & x > 1 \end{cases}$$

http://bit.ly/detcont1

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

$$\lim_{x \to 1^-} 2x+5 = 7 = \lim_{x \to 1^+} (ax+2)$$

$$7 \overset{\checkmark}{=} 7 \overset{\checkmark}{=} a+2$$

$$5 = a$$

[redacted]

Find the values of *a* and *b* such that g(x) is continuous

http://bit.ly/detcont3

$$g(x) = \begin{cases} -2x^2 + 3, & x < 0 \\ ax + b, & 0 \le x \le 1 \\ 9x & x > 1 \end{cases}$$

@ x = 0

$$\lim_{x \to 0^-} g(x) = g(0) = \lim_{x \to 0^+} g(x)$$

$$3 = a(0) + b = b$$

$$3 = b = b$$

@ x = 1

$$\lim_{x \to 1^-} g(x) = g(1) = \lim_{x \to 1^+} g(x)$$

$$a(1) + b =$$

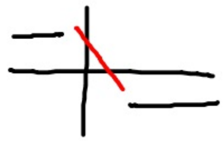
$$a + b = a + b = 9$$

$$a + 3 = 9$$

$$a = 6$$

Good afternoon: warm up

Find the values of a and b to make f continuous



$$f(x) = \begin{cases} 2, & x \le -1 \\ ax + b, & -1 < x < 3 \\ -2, & x \ge 3 \end{cases}$$

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

$$2 = 2 = -a + b$$

$$\Rightarrow b - a = 2$$

$$\lim_{x \to 3^-} f(x) = f(3) = \lim_{x \to 3^+} f(x)$$

$$3a + b = -2 = -2$$

$$3a + b = -2$$

$$\begin{cases} b - a = 2 \Rightarrow b = 2 + a \\ 3a + b = -2 \end{cases}$$

$$3a + 2 + a = -2$$

$$4a + 2 = -2$$

$$4a = -4 \Rightarrow a = -1$$

$$b = 2 + -1 = 1$$

$$a = -1$$
$$b = 1$$

Consider the function $f(x)=10.32+1.9x-x^2$

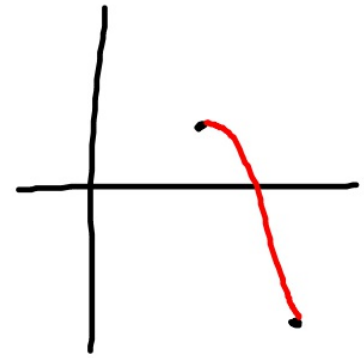
$f(4)=1.92$

a.) Find f(4) and f(5)

$f(5) = -5.18$

b.) Is x=4.5 a root of f(x)?

c.) Explain why f(x) must have a root between 4 and 5.



b) No, $f(4.5) \neq 0$

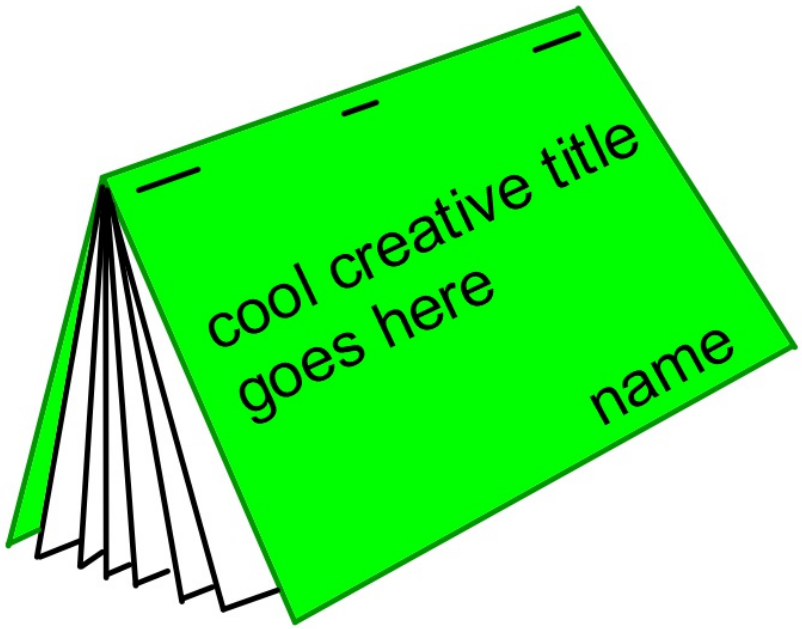
$= -1.38$

c.) to go from

1.92 to -5.18

must pass thru 0

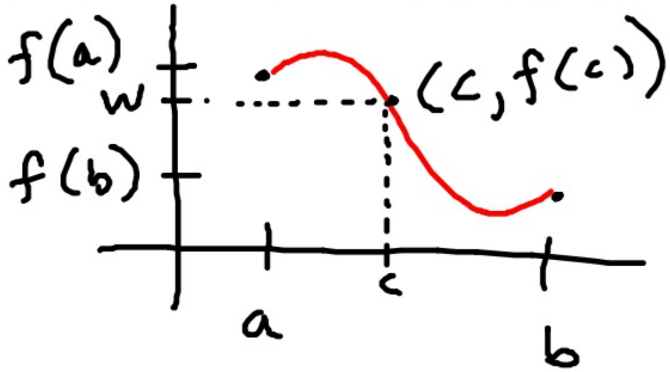
Assemble your formulas and theorem booklet :)



Intermediate Value Theorem

BOOKLET

If f is continuous on [a,b] and w is some number between f(a) and f(b), then there exists some number c in [a,b] such that $f(c) = w$



The IVT only applies to continuous functions!!!

The Warriors have 26 points at the end of the first quarter.
Later they have 48 points at half time.
So they must have had 30 points at some point in Q2.

Ex: Use the IVT to show $f(x) = x^2 - 6x + 8$ has a zero in $[0,3]$

$[a, b]$

$f(x)$ is continuous b/c ..polynomial.

- $f(0) = 8$
- $f(3) = 3^2 - 6(3) + 8 = -1$

By the IVT, there is some number c in $[0,3]$ such that $f(c) = 0$ b/c. $f(0) > f(c) > f(3)$.

$8 > 0 > -1$

Use the IVT to show that sin(x) has a root in [π/2, 3π/2]

f(x) is cont. b/c f(x)= sine wave.

$f(\frac{\pi}{2}) = 1$

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

$\Longrightarrow$ By the IVT, there exists some c in $[\frac{\pi}{2}, \frac{3\pi}{2}]$ such that

$$f(\frac{\pi}{2}) > f(c) > f(\frac{3\pi}{2})$$

1 > 0 > -1

Find the value of c that is in [0,7] that is guaranteed to exist by the IVT for $f(x)=x^2+6x+1$ such that $f(c)=28$

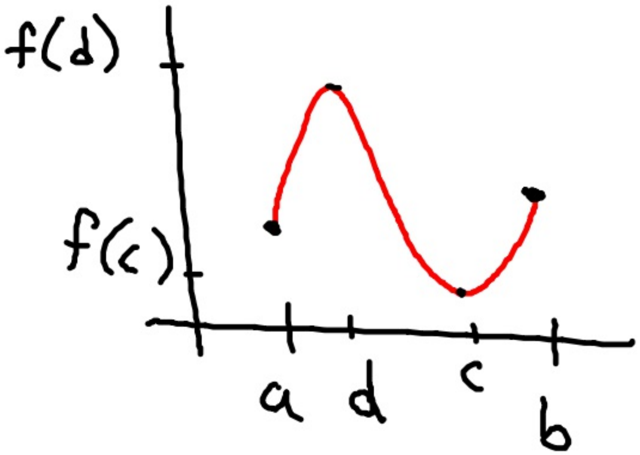
to be done later

The Extreme Value Theorem

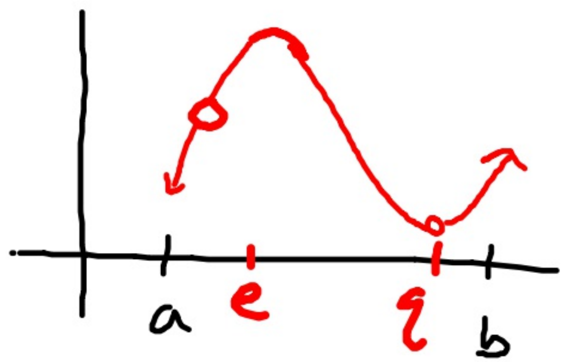
BOOKLET

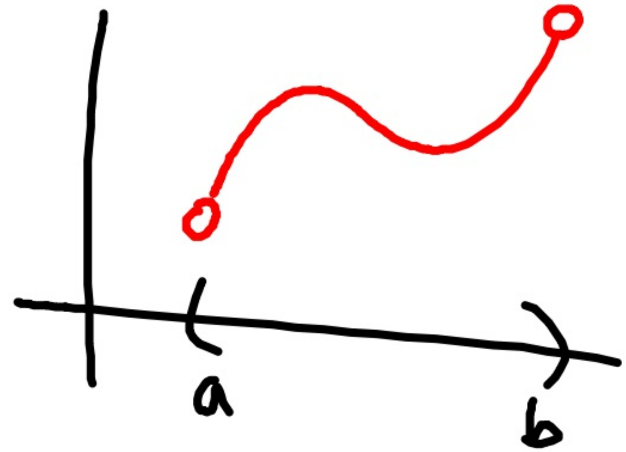
If f(x) is continous on closed interval [a,b], then f(x) must have a maximum and a minimum value.

There exists some c and d in [a,b] such that $f(c) \leq f(x) \leq f(d)$ for all x in [a,b]



Why must f(x) be continuous for EVT? Why must the interval be closed?





Assessment Friday:

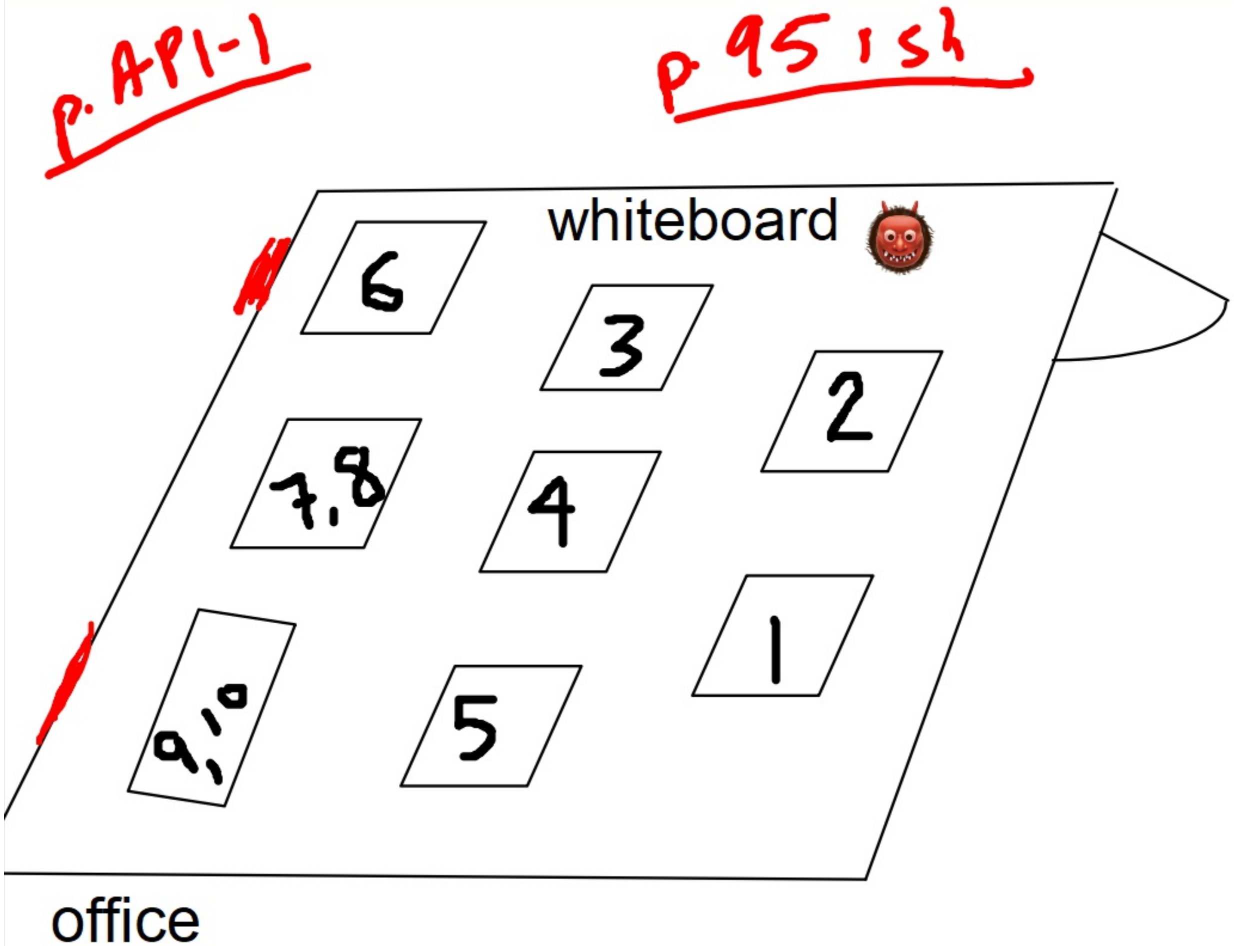
- given absolute value function, find limit
- given piecewise function, show if it is/isnt continous at a point
- find the values that make a function continuous
- find and classify discontinuities, justify w/ limits

<u>New Skills</u>

F-L2b
F-C1
F-C2
F-C3

Reviewing Limits and Continuity

turn to page...95ish? right after 94, called AP1-1



Each group assigned a problem or 2

Solve it together in notebooks

Meanwhile, 1 person copies problem onto chart paper

Once solved, put solutions on chart paper

HW
do limits packet due next Weds

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