Today's Plan:

Learning Target (standard): I will discuss the continuity of a function.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make neccessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Find domain.

$$f(x) = \frac{\sqrt{x-2}}{x^2 - 8x + 9}$$

$x-2 \geq 0$

$x \geq 2$

$x^2 - 8x + 9 = 0$

$x^2 - 8x + 16 = -9 + 16$

$\sqrt{(x-4)^2} = \pm\sqrt{7}$

$x - 4 = \sqrt{7}, -\sqrt{7}$

$x = 4 + \sqrt{7}, 4 - \sqrt{7}$

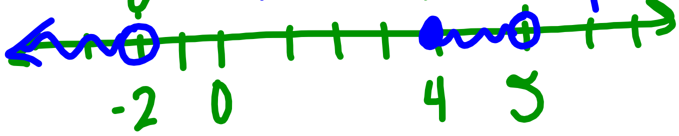
$D: \{x \mid x \geq 2, x \neq 4 + \sqrt{7}\}$

Find domain.

$$f(x)=\sqrt{\frac{4-x}{x^2-3x-10}}$$

$$\frac{4-x}{(x-5)(x+2)} \geq 0$$

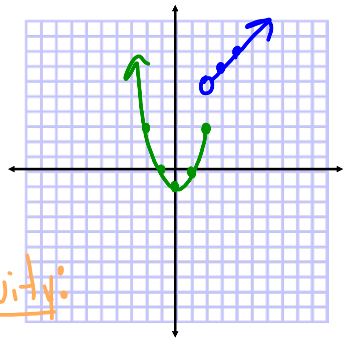
$4-x$	$+$		$+$	0	$-$		$-$
$x-5$	$-$		$-$		$-$	0	$+$
$x+2$	$-$	0	$+$		$+$		$+$



D: $\{x \mid x<-2,\ 4 \leq x<5\}$

Graph. Find domain and range. Justify the discontinuity.

$$f(x)=\begin{cases} x^2-1, & \boxed{x \leq 2} \\ x+4, & x>2 \end{cases}$$



D: $\mathbb{R}$

R: $\{y \mid y \geq -1\}$

Jump Discontinuity:

1) $f(2)=3$

2) $\lim_{x\to 2^-} f(x)=3$

$\lim_{x\to 2^+} f(x)=6$ $\therefore \lim_{x\to 2} f(x)=\text{DNE}$

3) $f(2) \neq \lim_{x\to 2} f(x)$

$\therefore$ Since f(2) is 3 and the left-hand limit and right-hand limit exist but are not infinite and are not equal to each other, there is a jump discontinuity at x = 3.

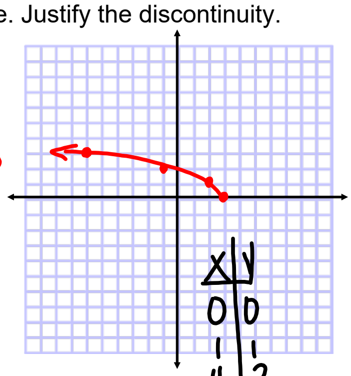
Graph. Find domain and range. Justify the discontinuity.

$f(x)=\sqrt{3-x}$

$3-x\geq 0$
$-x\geq -3$
$x\leq 3$

D: $\{x|x\leq 3\}$

R: $\{y|y\geq 0\}$



x	y
0	0
1	1
4	2
9	3

Domain Issue:

1) $f(3)=0$

2) $\lim_{x\to 3^-} f(x)=0$

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

$\therefore \lim_{x\to 3} f(x)=\text{DNE}$

3) $f(3)\neq \lim_{x\to 3} f(x)$

$\therefore$ Since the domain of the function is $\{x|\ x\leq 3\}$, there is a domain issue on $(3,\infty)$. Every x-value in the domain has a y-value, has left and right-hand limits except at x = 3, and the limits are equal to the y-values. There are no x-values greater than x = 3.

Process for Determining Continuity

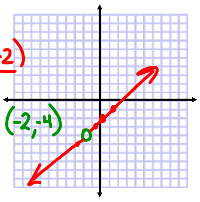
- Step 1: Graph f(x) & find domain
- Step 2: Describe where f(x) is continuous
- Step 3: Describe discontinuities - "math"
- Step 4: Justify discontinuities - conclusion

Discuss the continuity:

$$f(x)=\frac{x^2-4}{x+2}=\frac{\cancel{(x+2)}(x-2)}{\cancel{x+2}}$$

$$\boxed{f(x)=x-2}$$

Hole: $(-2,-4)$



1) D: $\{x \mid x \neq -2\}$

2) Continuous on: $(-\infty,-2)\cup(-2,\infty)$

3) Removeable Discontinuity @ $x=-2$.

a. $f(-2)=$ undefined

b. $\lim_{x\to -2^-} f(x)=-4$

$\lim_{x\to -2^+} f(x)=-4$

$\therefore \lim_{x\to -2} f(x)=-4$

c. $f(-2)\neq \lim_{x\to -2} f(x)$

4) $\therefore$ Since $f(-2)$ is undefined and the left-hand and right-hand limit exist and are equal but not infinite, there must be a removeable discontinuity @ $x=-2$.

Assignment:

Assignment 6 #2-7

* Use the process to discuss the continuity of each function *