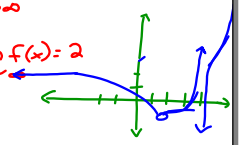
(56) $\lim_{x\to 2} f(x) = -1$ $\lim_{x\to\infty} f(x) = \infty$

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

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



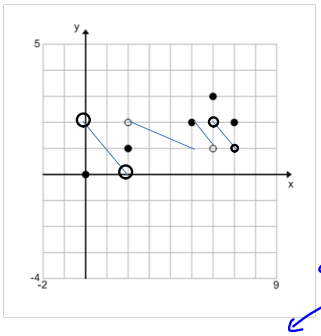
Sep 24-10:09 AM

2-3 Connuity

Learning Targets

- I can idenfy when/where a funcon is disconnuous.
- I can classify disconnuies.
- I can write an extended funcon that removes a removable disconnuity.
- I understand how the Intermediate Value Theorem applies to connuous funcons.

Sep 12-10:35 AM



con.

con.

discontinuous

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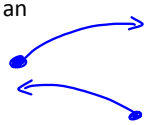
Connuity at a Point

Interior points: A funcon y = f(x) is connuous at an interior point c if

$$\lim_{x\to c} f(x) = f(c)$$

Endpoints: A funcon y=f(x) is connuous at an endpoint if



le endpoint

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

right endpoint

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

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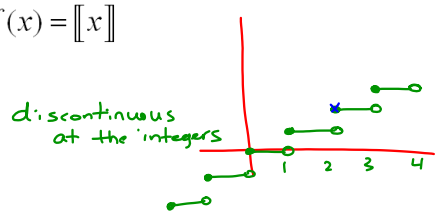
Find the points of connuity and the points of disconnuity for each funcon.

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



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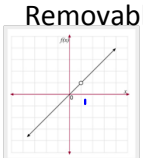
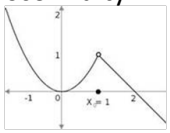
Types of Disconnuity

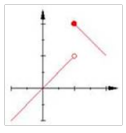
- Removable Disconnuity





$y = \begin{cases} x, & x \neq 1 \\ 1, & x = 1 \end{cases}$

- Jump Disconnuity



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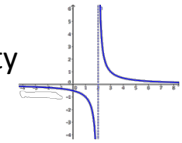
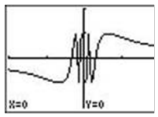
Types of Disconnuity (cont'd)

3. Infinite Disconnuity



4. Oscillang Disconnuity

$y = \sin\left(\frac{1}{x}\right)$



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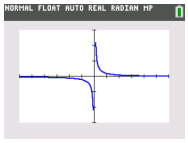
Find the domain and range for each funcon and discuss any disconnuies.

$f(x) = \frac{1}{x}$



Domain: $\mathbb{R}$ $x \neq 0$

Range: $\mathbb{R}$ $y \neq 0$

Infinate Discontinuity at $x = 0$

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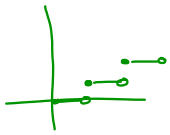
$f(x) = [\![x]\!]$



D: all reall #'s

R: all integers

Jump Dis. Continuity at each integer

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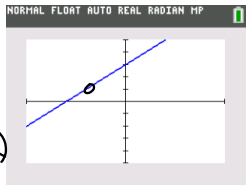
$f(x) = \frac{x^2+5x+6}{x+2}$

$\frac{(x+3)(x+2)}{(x+2)}$



hole at -2 $(-2, 1)$

domain $= \mathbb{R}$ $x \neq -2$

range $= \mathbb{R}$ $y \neq 1$

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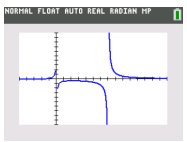
Find the domain and range of:

$\frac{(x+2)(x+3)}{x^3-4x^2-21x} = \frac{x^2+5x+6}{x(x-7)(x+3)}$



inf. disc. at $x = 0, x = 7$

hole at $(-3, \frac{1}{30})$

D: $x \neq -3, 0, 7$

R: $y \neq 0, \frac{1}{30}$

Sep 8-12:41 PM

Properes of Connuous Funcons

If funcons f and g are connuous at x=c, then the following combinaons are connuous at x=c.

- Sums: $f+g$
- Differences: $f-g$
- Products: $f \cdot g$
- Constant Mulples: $k \cdot f$ (if k is constant)
- Quoents: $\frac{f}{g}$ (if g(c) does not equal 0)
- Composites: $f \circ g$ and $g \circ f$

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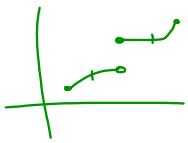
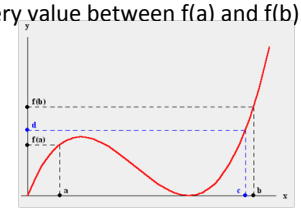
Intermediate Value Theorem for Connuous Funcons

A funcon y=f(x) that is connuous on a closed interval [a,b] takes on every value between f(a) and f(b).





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Homework:

p. 84 #1-4, 10-18, 21-25, 41-44

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Sep 12-10:35 AM