Goals

Better Understanding

Continuity

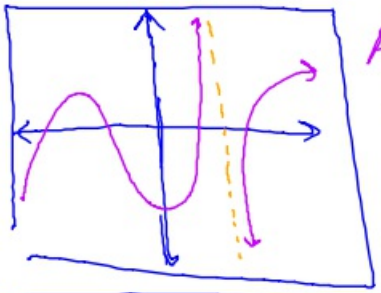
Hw p 77

#33-48, 57-60

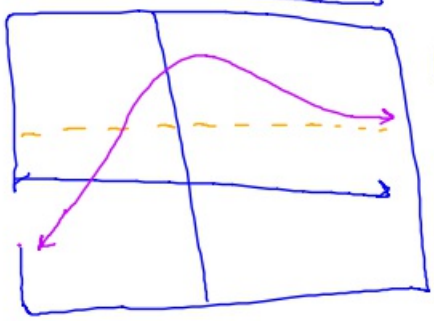
#88-90

• Define Continuity. (in math)

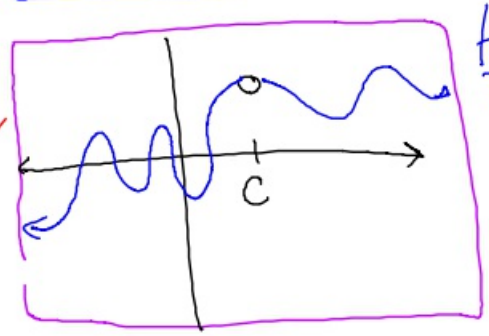
a function that can be graphed without picking up one's pencil.



Vertical Asymptote
↳ must pick up pencil.



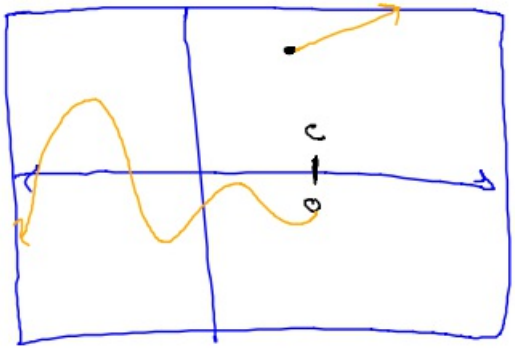
Has H.a. → not necessarily discontinuous.
but is continuous.



Hole in graph
D is continuous.

Removable Disc ⇒ limit exists, but pt does not.

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



Jump in graph
⇒ ~~R~~ D is continuous.

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

Both limits are finite.

ex

$$\lim_{x \to 3} \frac{x^2 - 6x + 9}{x - 3}$$

What type of Disc @ $x = 3$?

$$\lim_{x \to 3} \frac{(x-3)(x-3)}{x-3}$$

limit exists.

($f(3) =$ ~~undefined~~.)

Removable

$$\lim_{x \to 3} \quad x - 3 = 3 - 3 = 0$$

ex/ $f(x) = \begin{cases} \frac{x}{2} - 5, & x \leq 4 \\ 2x, & x > 4 \end{cases}$

What happens @ $x=4$?

(to the limits)

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

$\lim_{x \to 4^-} \frac{x}{2} - 5$

$\frac{4}{2} - 5$

$2 - 5$

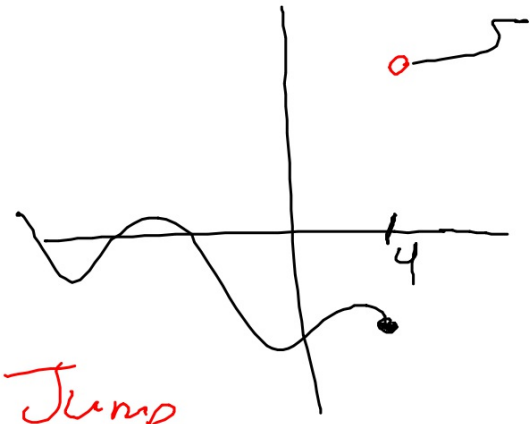
-3

$\lim_{x \to 4^+} f(x)$ (bottom)

$\lim_{x \to 4^+} 2x$

$2(4)$

8



Jump Disc. @ $x=4$.

V.A. $\longleftrightarrow$ Infinite Discontinuity.

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

or

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