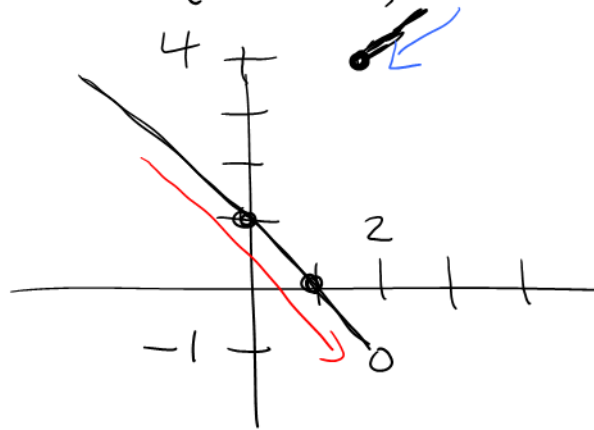


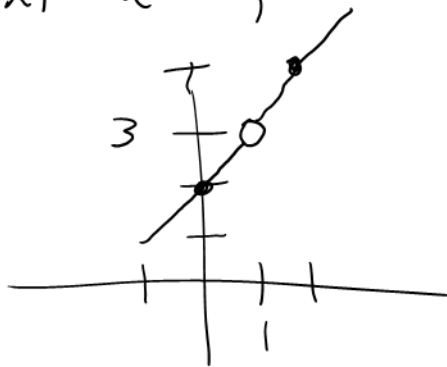
Ex: $f(x) = \begin{cases} x+2, & x \geq 2 \\ 1-x, & x < 2 \end{cases}$



As $x \rightarrow 2$ from the left, $f(x) \rightarrow -1$
 " " right, $f(x) \rightarrow 4$

$\lim_{x \rightarrow 2} f(x)$ does not exist

Ex: $f(x) = x+2, x \neq 1$



$$\lim_{x \rightarrow 1} f(x) = 3$$

Limit exists even though $f(x)$ is not defined at $x=1$



Review: Factoring

Ex: a) $x^2 + 8x + 7$
 $= (x+1)(x+7)$

b) $x^2 - 100$
 $= (x-10)(x+10)$

c) $2x^2 + 5x + 2$

ac method
add to 5
multiply to $2(2) = 4$
1, 4

$= 2x^2 + \underbrace{x} + \underbrace{4x} + 2$

$= x(2x+1) + 2(2x+1)$

$= (x+2)(2x+1)$

Ex: Find $\lim_{x \rightarrow 5} \frac{x^2 - 25}{x - 5}$

Function is not continuous at $x=5$

$= \lim_{x \rightarrow 5} \frac{\cancel{(x-5)}(x+5)}{\cancel{x-5}}$

$= \lim_{x \rightarrow 5} x+5$

Function is continuous at $x=5$

$$= 10$$

Ex: Find $\lim_{x \rightarrow -4} \frac{x^2 - 3x - 28}{2x + 8}$ $\left(\frac{0}{0} \text{ no info}\right)$

$$= \lim_{x \rightarrow -4} \frac{\cancel{(x+4)}(x-7)}{2\cancel{(x+4)}}$$

$$= \frac{-11}{2}$$

Ex: Find $\lim_{x \rightarrow 0} \frac{x^2 + 9x}{x^2 + x}$ $\left(\frac{0}{0} \text{ no info}\right)$

$$= \lim_{x \rightarrow 0} \frac{\cancel{x}(x+9)}{\cancel{x}(x+1)}$$

$$= 9$$