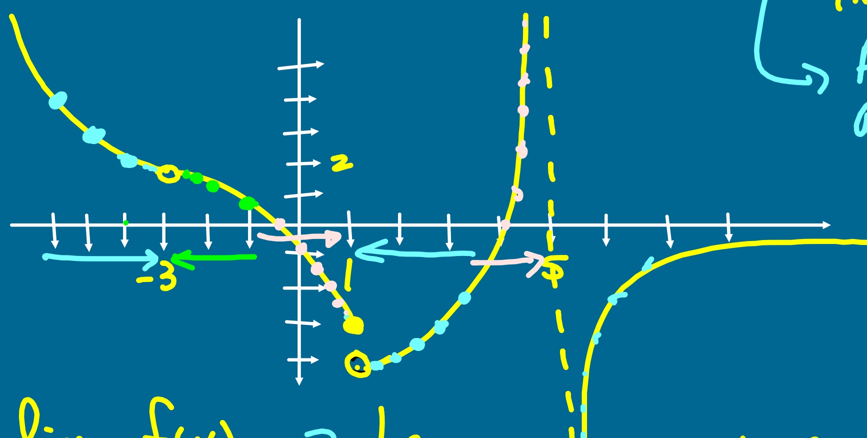
INTRO TO CALCULUS

- LIMITS
- DERIVATIVES
- INTEGRALS

As x-coord approaches a #, what is y-coord approaching?



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

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

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

$f(-3) =$ undef.

$\lim_{x \to 1^-} f(x) = -3$

$\lim_{x \to 1^+} f(x) = -4$

$\lim_{x \to 1} f(x) =$ DNE

$f(1) = -3$

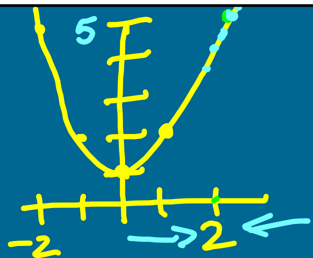
$\lim_{x \to 5^-} f(x) = +\infty$

$\lim_{x \to 5^+} f(x) = -\infty$

$\lim_{x \to 5} f(x) =$ DNE

$f(5) =$ undef.

$$\lim_{x \to 2} x^2+1$$
$$= 2^2+1 = 5$$



1) Sub # in
2) If $\frac{0}{0}$, a) factoring
b) conjugate

$$\lim_{x \to -4} \frac{x^2-3x}{\sqrt{x+8}} = \frac{(-4)^2-3(-4)}{\sqrt{-4+8}} = \frac{16+12}{\sqrt{4}} = \frac{28}{2} = \boxed{14}$$

$$\frac{0}{7} = 0 \quad \frac{7}{0} = \text{undef}$$

$$\lim_{x \to 3} \frac{x^2+4x-21}{x^2-3x} = \frac{9+12-21}{9-9} = \frac{0}{0} \text{ indeterminate}$$

$$= \lim_{x \to 3} \frac{(x+7)\cancel{(x-3)}}{x\cancel{(x-3)}}$$

$$= \frac{3+7}{3} = \frac{10}{3}$$

May 5, 2025

$$\lim_{x \to -5} \frac{x^3+125}{x^2-25} = \frac{(-5)^3+125}{(-5)^2-25} = \frac{-125+125}{25-25} = \frac{0}{0}$$

$$\lim_{x \to -5} \frac{\cancel{(x+5)}(x^2-5x+25)}{\cancel{(x+5)}(x-5)} = \frac{25+25+25}{-5-5} = \frac{75}{-10}$$

$$= -\frac{15}{2}$$

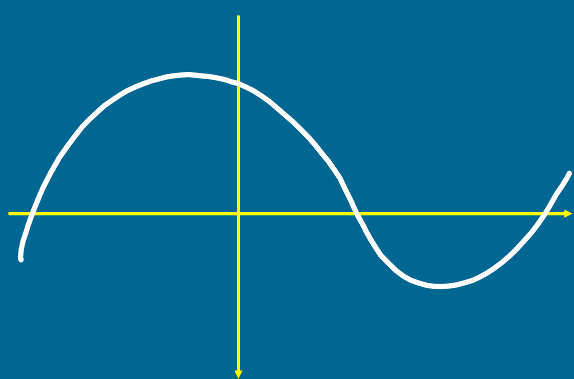
$$\lim_{x \to 64} \frac{\sqrt{x}-8}{x-64} = \frac{\sqrt{64}-8}{64-64} = \frac{0}{0}$$

$$\lim_{x \to 64} \frac{\sqrt{x}-8}{x-64} \frac{(\sqrt{x}+8)}{(\sqrt{x}+8)}$$

$$\lim_{x \to 64} \frac{\cancel{x-64}}{\cancel{(x-64)}(\sqrt{x}+8)}$$

$$= \frac{1}{\sqrt{64}+8} = \frac{1}{16}$$

DERIVATIVES



Pretend

$f(x) = x^4 - 3x^3 + 2x^2 + x + 1$

$f(x) = 3x^2 + 4x - 5$

$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

Find $f'(a)$.