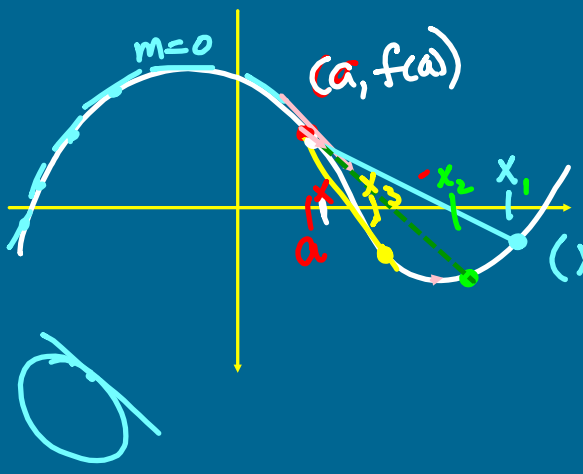
$$\lim_{x \to -5} \frac{x^3 + 125}{x^2 - 25}$$

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

DERIVATIVES – represents the slope of a line tangent to a curve at a given point.



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

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

Definition of the Deriv.

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

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

Find $f'(a)$.

$$\lim_{x \to a} \frac{(3x^2 + 4x - 5) + (-3a^2 - 4a + 5)}{x - a}$$

$$\lim_{x \to a} \frac{[3x^2 - 3a^2] + [4x - 4a]}{x - a}$$

$$\lim_{x \to a} \frac{3(x-a)(x+a) + 4(x-a)}{x - a}$$

$$\lim_{x \to a} 3(x+a) + 4 = 3(a+a) + 4$$

$$= \boxed{6a + 4}$$

Func.	Deriv
$f(x)$	$f'(x)$
$y =$	$y' =$
	$\frac{dy}{dx} = \frac{\Delta y}{\Delta x}$

$f(x)$	$f'(x)$
$3x^2+4x-5x^1$	$6x+4$
$5x^3-4x^7$	$15x^2-28x^6$
$\frac{1}{x^2}$	$-\frac{2}{x^3}$
$=x^{-2}$	$-2x^{-3}$

Power Rule

$$\frac{d}{dx}x^n = nx^{n-1}$$

$$f(x) = 4x^8 + \frac{2}{x^3} - 4x + 7 - \sqrt{x}$$

$$= 4x^8 + 2x^{-3} - 4x^1 + 7x^0 - x^{1/2}$$

$$f'(x) = 32x^7 - 6x^{-4} - 4(0) - \frac{1}{2}x^{-1/2}$$