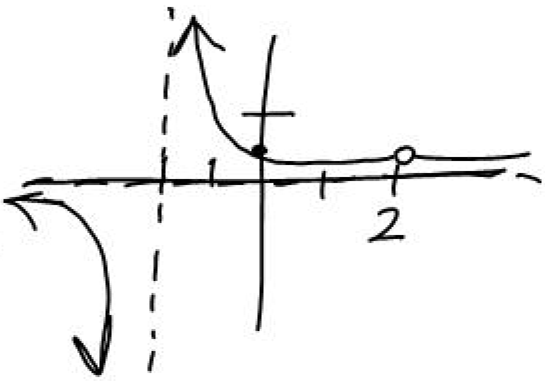
Set Two

① $$\lim_{x\to 2} \frac{\cancel{x-2}\;\; 1}{\cancel{(x-2)}(x+2)} = \frac{1}{4}$$



③ $$\lim_{x\to 1} \frac{(2x+1)\cancel{(x-1)}}{(2x+3)\cancel{(x-1)}} = \frac{3}{5}$$

⑤ $$\lim_{x\to 0} \frac{(2+x)^3-8}{x} = \lim_{x\to 0} \frac{\cancel{8}+12x+6x^2+x^3-\cancel{8}}{x}$$

$$= \lim_{x\to 0} \frac{\cancel{x}(12+6x+x^2)}{\cancel{x}} = 12$$

Ex. $$\lim_{x\to 3} \frac{\sqrt{4x+4}-4}{x-3} \cdot \frac{\sqrt{4x+4}+4}{\sqrt{4x+4}+4}$$

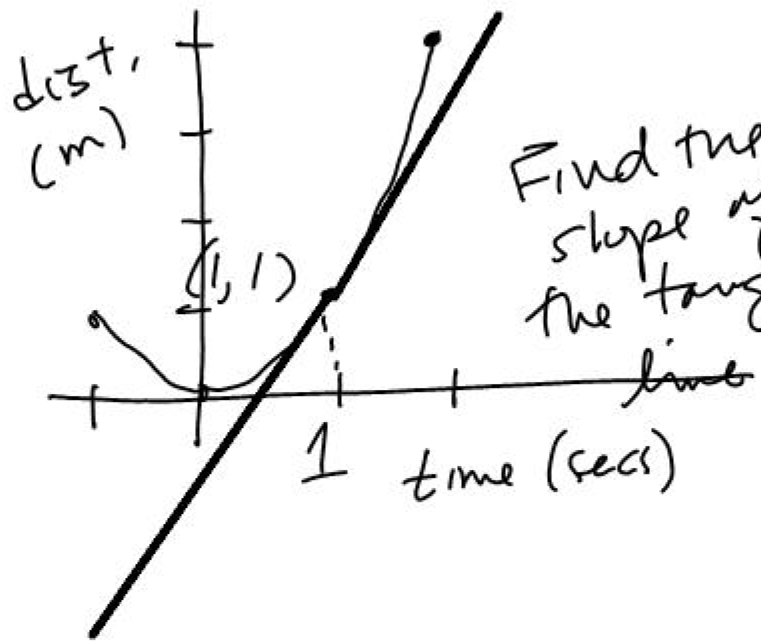
$4x-12$

$$= \lim_{x\to 3} \frac{(4x+4)-16}{(x-3)(\sqrt{4x+4}+4)}$$

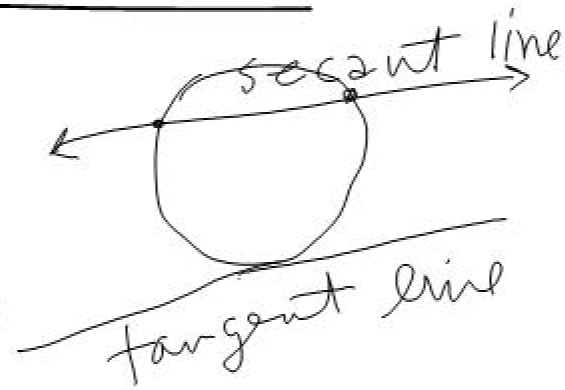
$$= \lim_{x\to 3} \frac{4\cancel{(x-3)}}{\cancel{(x-3)}(\sqrt{4x+4}+4)} = \frac{4}{8}$$

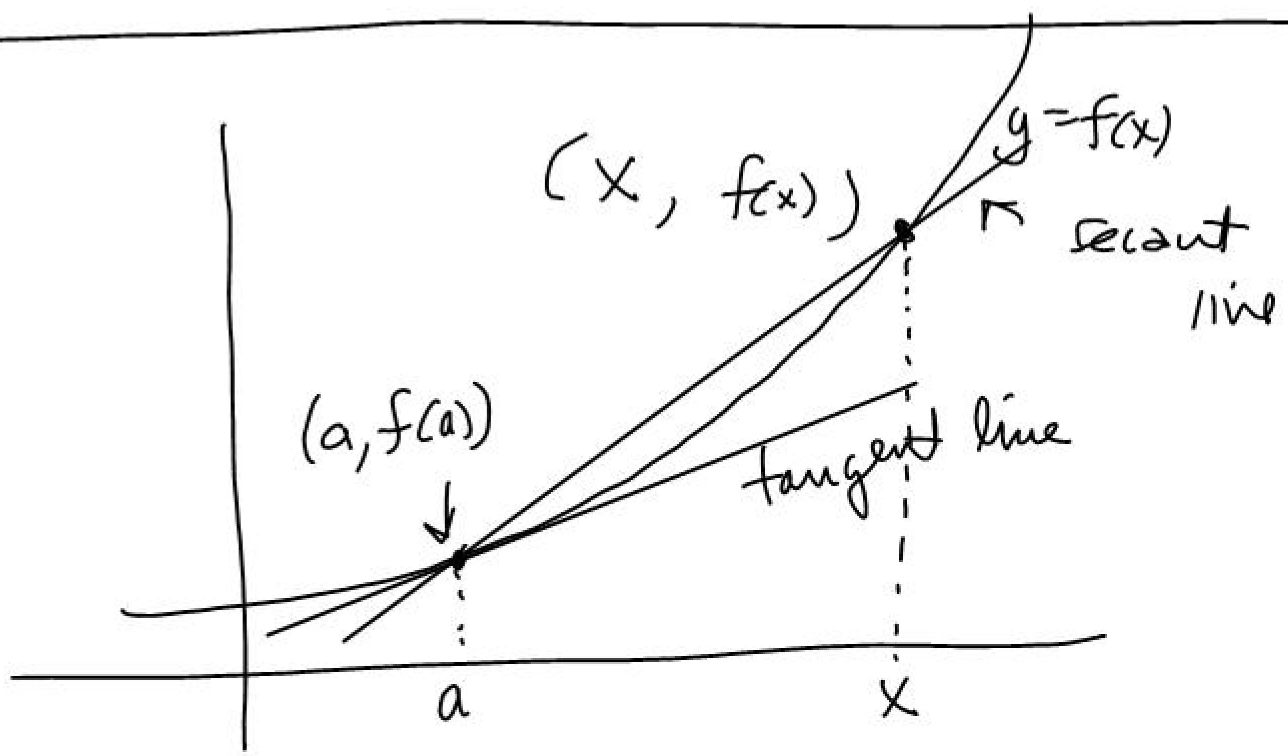
$$\frac{1}{2}$$

The Tangent Line Question



Find the slope of the tangent ~~line~~





secant line slope is $\dfrac{f(x) - f(a)}{x - a}$

tangent line slope is $\boxed{f'(a) = \lim_{x \to a} \dfrac{f(x) - f(a)}{x - a}}$

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Ex Find the slope of the line tangent to $y = x^2$ at $x = 1$.

$f(1)$

$$f'(1) = \lim_{x \to 1} \frac{x^2 - 1}{x - 1}$$

$$= \lim_{x \to 1} \frac{(x+1)\cancel{(x-1)}}{\cancel{x-1}} = 2$$

EX. find the slope of $y = x^3$ at $x = 2$.

$$f'(2) = \lim_{x \to 2} \frac{x^3 - 8}{x - 2}$$

$$\begin{array}{r|rrrr} 2 & 1 & 0 & 0 & -8 \\ & & 2 & 4 & 8 \\ \hline & 1 & 2 & 4 & \boxed{0} \end{array}$$

$$= \lim_{x \to 2} \frac{\cancel{(x-2)}(x^2+2x+4)}{\cancel{x-2}}$$

$$= 4 + 4 + 4 = \underline{12}$$

Math $\boxed{8}$

nDeriv $(x^3, x, 2)$

$$\frac{d}{d\boxed{x}}\left(x^3\right)\Bigg|_{\boxed{x}=\boxed{2}}$$

Ex. $f(x) = 4 - 3x^2 \quad f'(-1)$

$$f'(-1) = \lim_{x \to -1} \frac{(4-3x^2) - 1}{x-(-1)}$$

$$= \lim_{x \to -1} \frac{-3x^2 + 3}{x+1}$$

$$= \lim_{x \to -1} \frac{-3(x^2 - 1)}{x+1}$$

$$= \lim_{x \to -1} \frac{-3(x-1)\cancel{(x+1)}}{\cancel{x+1}} = 6$$

HW Set Two # 2, 4 - 10

- $F(x) = 2x^2 - x + 4$

  $f'(3)$