

Midterm  
through 3.2

3.3 try derivs

- Photo ID
- Calculator
- page of notes  
handwritten  
2-sided

Gradescope

2-sided

write name

on every page

Page of limits

velocity & acc

av vel

inst vel

equ'n of fan line

where is tan horiz?

def'n of derivative

$$\sqrt{3x+7}$$

$$\#4 \quad f(x) = \sqrt{x^2 + 5}$$

$$f'(2) \quad \checkmark$$

$$\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h}$$

$$f(2) = \sqrt{9} = 3$$

$$\lim_{h \rightarrow 0} \frac{\sqrt{(x+h)^2 + 5} - 3}{h} \quad \frac{\sqrt{m+3}}{\sqrt{m+3}}$$

#3

$$y = \frac{x^2 + 1}{x - 3} \quad (4, 17)$$

$$(a) \quad y - 17 = m(x - 4)$$

$$\frac{dy}{dx} = \frac{(x-3)' \cdot (x^2+1) - (x^2+1)' \cdot (x-3)}{(x-3)^2}$$

$$x=4$$

$$\left. \frac{dy}{dx} \right|_{x=4}$$

$$= \frac{1 \cdot 8 - 17 \cdot 1}{1^2}$$

$$= -9$$

$$y - 17 = -9(x - 4)$$

$$(b) \quad 0 = \frac{dy}{dx}$$

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

only need to look at  
top

$$2x^2 - 6x - x^2 - 1 = 0$$

$$x^2 - 6x - 1 = 0$$

then

$$x = \frac{6 \pm \sqrt{40}}{2} \quad \checkmark$$

$$= 3 \pm \sqrt{10}$$



$$\textcircled{c} \lim_{x \rightarrow \infty} \frac{x+1}{\sqrt{x^2+1}} \cdot \frac{y_x}{y_x}$$

$$= \lim_{x \rightarrow \infty} \frac{1 + \frac{1}{x}}{\sqrt{x^2+1} \cdot \sqrt{\frac{1}{x^2}}}$$

$$= \lim_{x \rightarrow \infty} \frac{1 + \frac{1}{x}}{\sqrt{(x^2+1) \cdot \frac{1}{x^2}}}$$

$$\sqrt{AB} = \sqrt{A} \sqrt{B}$$

$$= \lim_{x \rightarrow \infty} \frac{1 + \frac{1}{x} \rightarrow 0}{\sqrt{1 + \frac{1}{x^2} \rightarrow 0}} = \frac{1}{\sqrt{1}}$$

$$y = x^3 - 4x^2$$

$$\text{tan } (6, 0)$$

$$(a, b)$$

$$y - b = m(x - a)$$

$$0 - b = m(6 - a)$$

$$b = a^3 - 4a^2$$

$$\frac{dy}{dx} = 3x^2 - 8x$$

$$m = 3a^2 - 8a$$



$$-(a^3 - 4a^2) = (3a^2 - 8a) (6 - a)$$

~~4~~

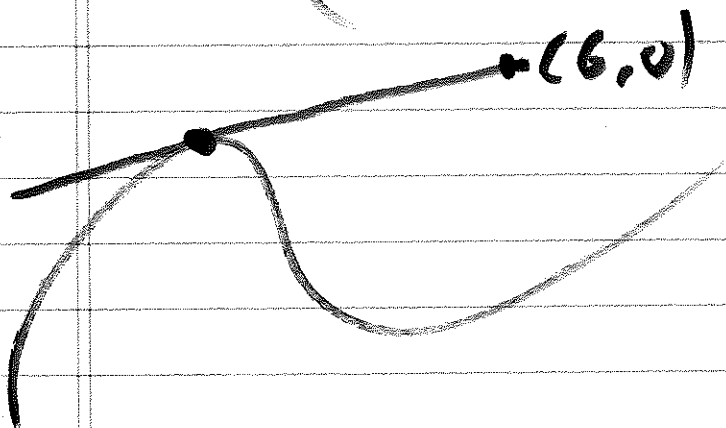
$$f(x) = |3 + 2x - x^2|$$

(a, b)

$$\text{tan} \perp x + 6y = 5$$

~~4~~

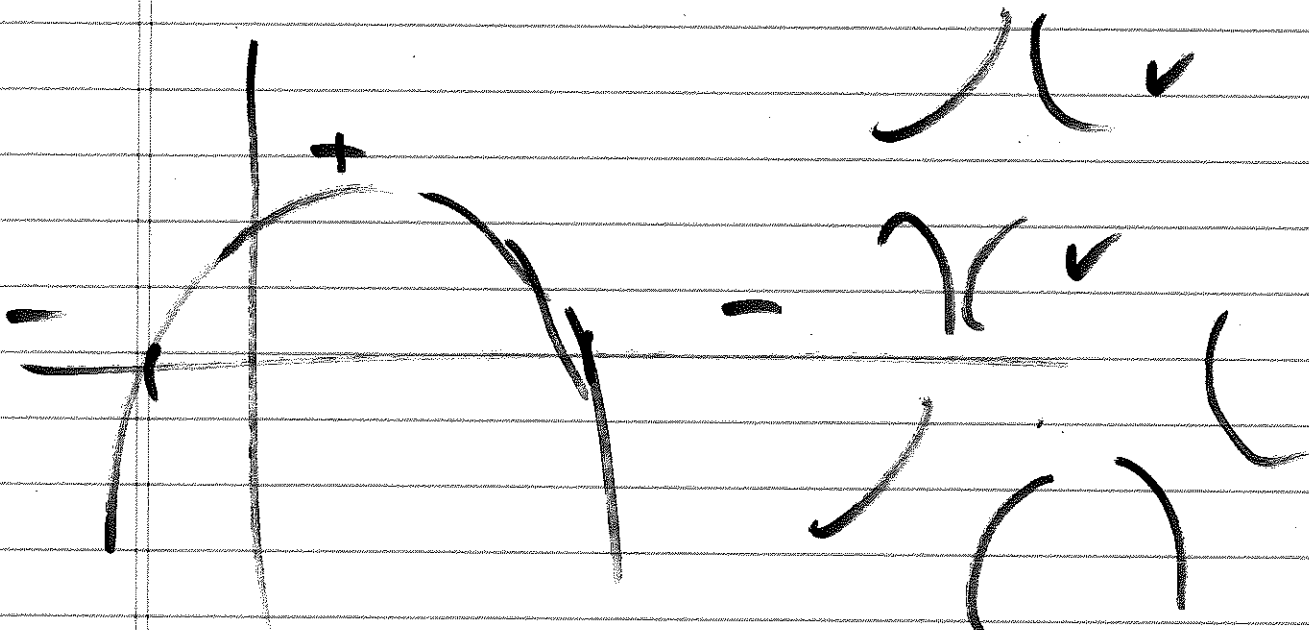
$$f(x) = \begin{cases} 3 + 4x - x^2 & -1 \leq x \leq 3 \\ -(3 + 4x - x^2) & \text{else} \end{cases}$$



$$y = 3 + 2x - x^2 = 0$$

$$\# x^2 - 2x - 3 = 0$$

$$(x-3)(x+1) = 0$$



$$f'(x) = \begin{cases} 2 - 2x & -1 < x < 3 \\ 2x - 2 \end{cases}$$