

thurs. wk 3

today: 3.1 (Derivative)

warm-up

$$50.5 = 25 - 5$$

Determine the given one-sided limit. Express the limit, if it exists, exactly in decimal form.

$$\lim_{x \rightarrow 5^-} \frac{9x^2 - 49x + 20}{x^2 - 25} = \frac{9x^2 - 45x - 4x + 20}{(x-5)(x+5)} = \frac{9x(x-5) - 4(x-5)}{(x-5)(x+5)} = \frac{(x-5)[9x-4]}{(x-5)(x+5)}$$

$$\lim_{x \rightarrow 5^-} \frac{9x-4}{x+5} \stackrel{\text{d.s.}}{=} \frac{9 \cdot 5 - 4}{5+5} = \frac{41}{10}$$

$$\lim_{x \rightarrow 5^-} \frac{9x^2 - 49x + 20}{x^2 - 25} = \boxed{4.1}$$

Factor 4 AC

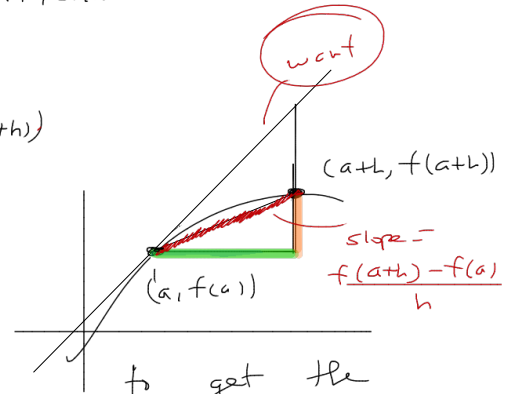
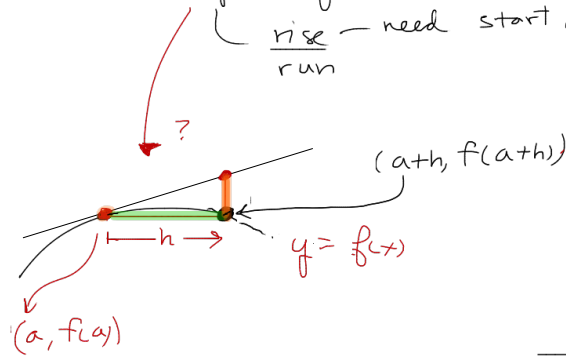
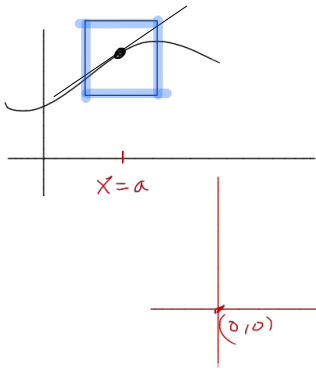
180

$$45 \cdot 4 = 180$$

Hint: factor easy one 1st  $(x^2 - 25) = (x-5)(x+5)$   
look for one of these factors in other poly

# The Derivative

We want to know the slope of curves @ a point



to get the slope we want, decrease h

We call

$$f'(a) \text{ the derivative of } f \text{ @ } a$$

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

(sometimes written

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

sub  $x = a+h$

Note 7

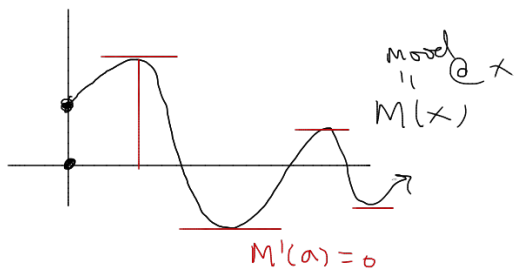
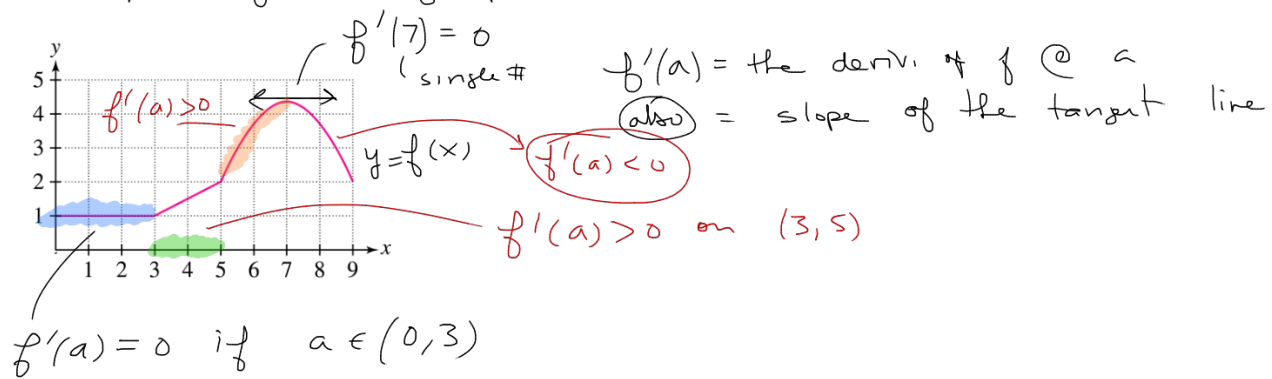
On wed, wk 3 we 1

① Let  $f(x) = 2x^2$ , computed  $f'(x) = 4x$   
derivative of  $f$

② Let  $f(x) = \sqrt{x}$ , computed  $f'(x) = \frac{1}{2\sqrt{x}}$

③ Let  $f(x) = \frac{1}{x}$ , got  $f'(x) = -\frac{3}{x^2}$

Ex Interpret  $f'(x)$  graphically



$M'(x) > 0 \Rightarrow$  mood is increasing

$M'(x) < 0 \Rightarrow$  mood is getting worse

$M'(x) = 0$  — mood is changing

~ Peaks / <sup>Bottom</sup>Valley  $\Leftrightarrow M'(x) = 0$

