Thurs. Wk 3

Today: 3.1 (Derivatives)

Factors of $AC = 9 \cdot 20 = 180$

$45 + 4$

warm-up:

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

$Ax^2 + Bx + C$

$$\lim_{x \to 5^-} \frac{9x^2 - 49x + 20}{x^2 - 25} = \frac{9 \cdot 25 - 49 \cdot 5 + 20}{0} = \frac{0}{0}$$

$$\frac{9x^2 - 45x - 4x + 20}{(x-5)(x+5)} = \frac{9x(x-5) - 4(x-5)}{\sim} = \frac{\cancel{(x-5)}(9x-4)}{\cancel{(x-5)}(x+5)}$$

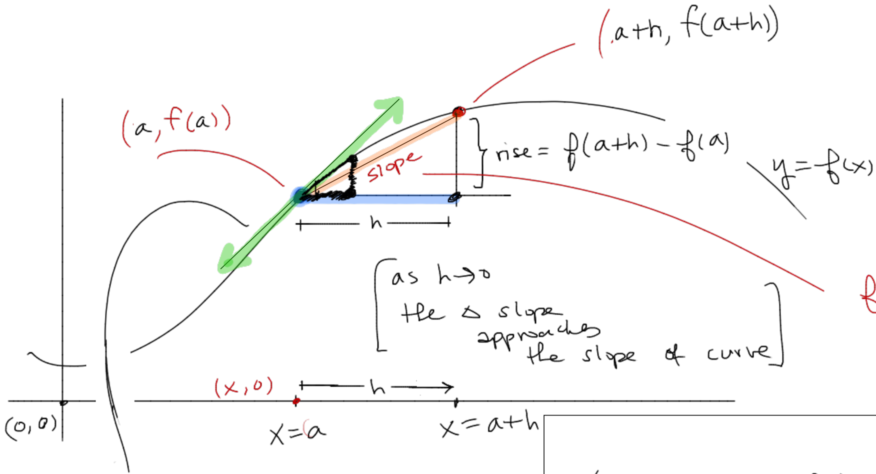
$$\lim_{x \to 5^-} \frac{9x - 4}{x + 5} \overset{d.s.}{=} \frac{45 - 4}{5 + 5} = \frac{41}{10}$$

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

Derivative

want to know: slope of curve @ point

$\frac{\text{rise}}{\text{run}}$ 



The derivative of f(x) at a

Slope of this tangent line $=$ $\boxed{f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}}$

f prime of a

On Wed, wk 3

① we let $f(x) = 5x^2$

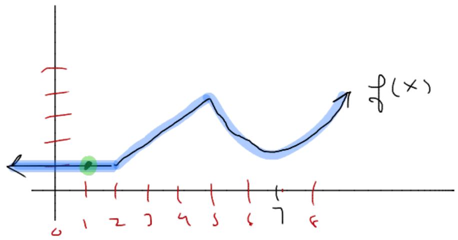
we computed $f'(x) = 10x$

② let $f(x) = 3\sqrt{x}$, computed $f'(x) = \frac{3}{2\sqrt{x}}$

③ let $f(x) = \frac{5}{x}$, computed $f'(x) = \frac{-5}{x^2}$

What is the derivative?

– slope of tangent line to graph



Q: Where is $f'(x)$ positive?

$(2,5) \cup (7, \infty)$

Zero? $(-\infty, 2) \cup \{7\}$

{peaks & troughs have derivatives that = 0}

find $x=1$, give slope @ this spot

Q: $f'(1) = 0$

$f'(3) =$

$f'(7) =$

Question 9 of 12

Suppose that f is a function such that $f(3+h) - f(3) = 2h^2 + 3h$.
(key: true for all possible h values)

Calculate $f'(3)$.

(Give your answer as a whole or exact number.)

$f'(3) =$ 3

Calculate the slope of the secant line through $(3, f(3))$ and $(5, f(5))$.

(Give your answer as a whole or exact number.)

$f(3+2)$
set $h=2$ in given.

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

derivative of f @ a

limit$_{h \to 0}$ difference quotient

$$f'(3) = \lim_{h \to 0} \underbrace{\frac{f(3+h) - f(3)}{h}}_{\text{ans}}$$

$$= \lim_{h \to 0} \frac{2h^2 + 3h}{h} = \frac{h(2h+3)}{h}$$

$$= \lim_{h \to 0} 2h + 3 = 3$$