DO NOW

pg 124; #20

3.1 Derivatives and the graph of Derivatives

pg 124; #20 $f(x) = x^3 + x^2$

$$\lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$\lim_{\Delta x \to 0} \frac{(x+\Delta x)^3 + (x+\Delta x)^2 - (x^3 + x^2)}{\Delta x}$$

$$\lim_{\Delta x \to 0} \frac{x^3 + 3x^2\Delta x + 3x(\Delta x)^2 + (\Delta x)^3 + x^2 + 2x\Delta x + (\Delta x)^2 - x^3 - x^2}{\Delta x}$$

$$\lim_{\Delta x \to 0} \frac{3x^2\Delta x + 3x(\Delta x)^2 + (\Delta x)^3 + 2x\Delta x + (\Delta x)^2}{\Delta x}$$

$$\lim_{\Delta x \to 0} 3x^2 + 3x\Delta x + (\Delta x)^2 + 2x + \Delta x$$

$$f'(x) = 3x^2 + 2x$$

Using $f(x) = x^3 + x^2$, find the y-coordinate for the following points:

a. $(1, y)$

$(1)^3 + (1)^2$

$y = 2$

$(1, 2)$

b. $(-2, y)$

$(-2)^3 + (-2)^2$

$-8 + 4$

$y = -4$

$(-2, -4)$

Find the slope of the graph at the two above points.

c. $(1, 2)$

$f'(x) = 3x^2 + 2x$

$3(1)^2 + 2(1)$

$3 + 2$

$m = 5$

d. $(-2, -4)$

$f'(x) = 3x^2 + 2x$

$3(-2)^2 + 2(-2)$

$3(4) + -4$

$m = 8$

Drawing the graph of the derivative function.

- ★ Look for tangent line with slope = 0.
- ★ Identify positive and negative sloping areas.
- ★ Look at whether small or large slopes
  (steeper line → larger slope)

Let's Practice...

Now let's identify graphs

HOMEWORK

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