MATH 151 | **QUIZ 2A** | NAME Answers
Mrs. Bonny Tighe | 2.5, 2.6, 3.1, 3.2 |
25 points | SECTION_______ Fri 2/17/06

1. Use the **definition** of a derivative to find the slope of the tangent line and use it to find an equation of the tangent line to the curve at the given point.

$f(x) = x - 3x^2 + 4$ at (1, 2)

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

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

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

$y - y_1 = m(x - x_1)$

$y - 2 = -5(x-1)$

$y = -5x + 7$

2. The cost of wheat, in dollars per ton, t days after the harvest, is given by W=p(t) What is the meaning of the derivative p'(t)? What are its units?

The rate that the cost of wheat is changing in \$ per ton per day

3. The position function of a particle after time t seconds is given by $s(t) = -t^2 - 8t + 10$.

a) Find the average velocity of the particle from t = 0 to t = 1 seconds.

$s(0) = 10$
$s(1) = 1$

$$\frac{s(1)-s(0)}{1-0} = \frac{1-10}{1} = -9 \text{ m/sec}$$

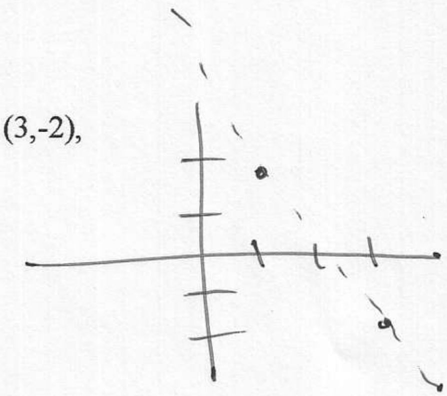
b) Find the instantaneous velocity of the ball at 1 sec., using the definition of derivative to find the slope.

$$\lim_{t\to 1} \frac{f(t)-f(1)}{t-1} = \lim_{t\to 1} \frac{-t^2-8t+10-1}{t-1} = \lim_{t\to 1} \frac{-(t^2+8t-9)}{t-1} = \frac{-(t+9)\cancel{(t-1)}}{\cancel{t-1}}$$

$$\lim_{t\to 1} -(t+9) = -10 \text{ m/sec}$$

c) Explain why the answers vary by so much.

4. If the tangent line to y = f(x) at (1,2) passes through the point (3,-2), find f(1)= 2 and f '(1)= -2



$$m = \frac{-2-2}{3-1} = \frac{-4}{2} = -2$$

5. Find the derivative of the given functions using the **definition of derivative**. State the domain of the function and the domain of the derivative.

a) $h(x) = \dfrac{2}{3-x}$

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

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

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

$$\lim_{h\to 0} \frac{\cancel{6}-\cancel{2x}-\cancel{6}+\cancel{2x}+2h}{(3-x-h)(3-x)h}$$

$$\lim_{h\to 0} \frac{2\cancel{h}}{(3-x-h)(3-x)\cancel{h}} = \frac{2}{(3-x)(3-x)}$$

$$h'(x) = \frac{2}{(3-x)^2}$$

b) $f(x) = 2\sqrt{x+4}$

$$\lim_{h\to 0} \left(\frac{2\sqrt{x+h+4}-2\sqrt{x+4}}{h}\right)\left(\frac{\sqrt{x+h+4}+\sqrt{x+4}}{\sqrt{x+h+4}+\sqrt{x+4}}\right)$$

$$\lim_{h\to 0} \frac{2(x+h+4-(x+4))}{h(\sqrt{x+h+4}+\sqrt{x+4})} =$$

$$\lim_{h\to 0} \frac{2\cancel{h}}{\cancel{h}(\sqrt{x+h+4}+\sqrt{x+4})}$$

$$\lim_{h\to 0} \frac{2}{\sqrt{x+h+4}+\sqrt{x+4}} =$$

$$\frac{2}{\sqrt{x+\cancel{h}+4}+\sqrt{x+4}} = \frac{2}{2\sqrt{x+4}}$$

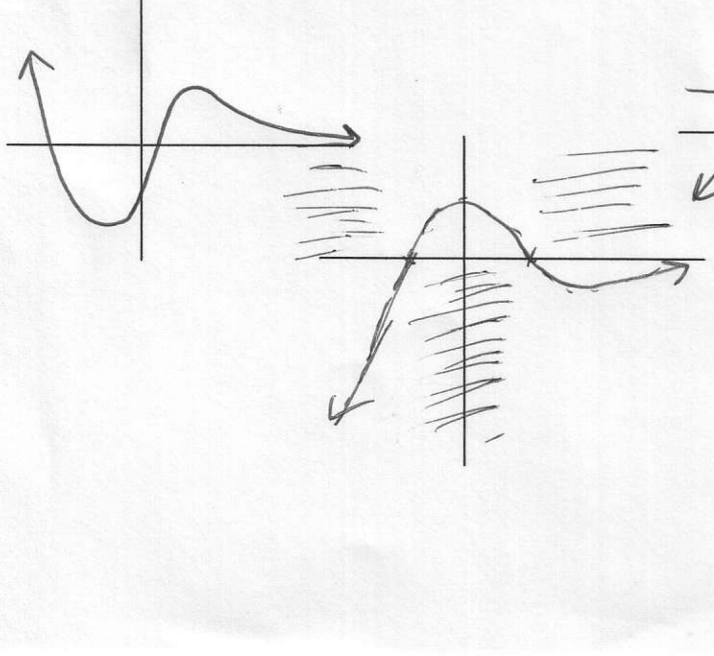
$$f'(x) = \frac{1}{\sqrt{x+4}}$$

6. Sketch f' beside each function f.

a)

f

f'



b)

f

f'