MATH 131
Quiz I
September 12, 1997          Name _____ Rey _____

Using calculus

1. What is the derivative $f'(x)$ of $f(x) = 2x^2 - 3x + 8$?

$$f'(x) = 4x - 3$$

5

2. Zoom in graphically on the function $f(x) = \sqrt{x}$ and estimate $f'(3)$, the slope of the tangent line at $x = 3$. Show work.

5
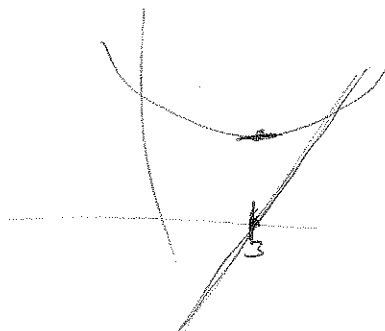
$2.88675$

$2.9 \times 3.6$

$.01$

3. What is the equation of the straight line tangent to the curve $y = 4x^2 + 4$ at $x = 1$?

$$y' = 8x$$
$$x = m = 8$$
$$y = 8$$
$$y - 8 = 8(x - 1)$$
$$y - 8 = 8x - 8 \qquad y = 8x$$

4

$2 \; 8x + 4 \qquad 8x + 1$

4. For what values of $x$ is the tangent line to the curve $y = x^2 - 6x + 12$ horizontal?

$$2x - 6 = 0$$
$$x = 3$$

6



5. Applying only the **definition** of the derivative, find $f'(x)$ for $f(x) = 4x^3 - 8x$.

$$\frac{4(x+h)^3 - 8(x+h) - (4x^3 - 8x)}{h}$$

$$= \frac{4(x^3 + 3x^2h + 3xh^2 + h^3) - 8x - 8h - 4x^3 + 8x}{h}$$

$$= \frac{4x^3 + 12x^2h + 12xh^2 + 4h^3 - 8x - 8h - 4x^3 + 8x}{h}$$

$$= \frac{h(12x^2 + 12xh + 4h^2 - 8)}{h} = 12x^2 + 12xh + 4h^2 - 8$$

$$f'(x) = \lim_{h \to 0} (12x^2 + 12xh + 4h^2 - 8) = 12x^2 - 8$$