Quiz 4 Key

Math 221, Lecture 2 - Fall 2010

Name: Key! Section: _____ Date: _____ Score: ____/10

There are 10 points possible. Partial credit may be given where applicable.
Solve each of the following problems. Show all of your work. (i.e. u = 1-5x, etc.) If you run out of room, you may use additional sheets of paper. **Be aware of problems on the back of the page.**

1. (5 pts.) Find an equation for the tangent line to the curve

$$y = x^3$$

at the point $(-2, -8)$.

$$\frac{dy}{dx} = 3x^2$$

slope at $(-2,-8) = \left.\frac{dy}{dx}\right|_{x=-2} = 3(-2)^2 = 12$

Equation of a line:

$$y - y_0 = m(x - x_0)$$

$$y + 8 = 12(x+2)$$

$$y + 8 = 12x + 24$$

$$\boxed{y = 12x + 16}$$

2. (5 pts.) Find the derivative of

$$f(x) = x^2 - 4x$$

using the **definition of derivative**. You will receive **zero** points for using the power rule on this problem.

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

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

$$= \lim_{h \to 0} \frac{x^2 + 2hx + h^2 - 4x - 4h - x^2 + 4x}{h}$$

$$= \lim_{h \to 0} \frac{2hx + h^2 - 4h}{h}$$

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

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

$$= 2x - 4.$$