Mathematics 122 **Quiz 7** **Name:** Key

Let

$$y = f(x) = 3x^2.$$

1 pt (1) What is the average rate of change of $f(x)$ between $x = 2$ and $x = 2.1$

$$\frac{\Delta y}{\Delta x} = \frac{3(2.1)^2 - 3(2)^2}{2.1 - 2} = 12.3$$

12.3

1 pt (2) What is the average rate of change of $f(x)$ between $x = 2$ and $x = 2.01$

$$\frac{\Delta y}{\Delta x} = \frac{3(2.01)^2 - 3(2)^2}{2.01 - 2} = 12.03$$

12.03

2 pts (3) What is the average rate of change between $x = 2$ and $x = 2 + h$? Simply your answer.

$$\frac{\Delta y}{\Delta x} = \frac{3(2+h)^2 - 3(2)^2}{(2+h) - 2}$$

$$= \frac{3(4 + 4h + h^2) - 12}{h}$$

$$= \frac{12 + 12h + 3h^2 - 12}{h}$$

$$= \frac{h(12 + 3h)}{h} = 12 + 3h$$

12 + 3h

1 pt (4) What is the instantaneous rate of change at $x = 2$? (HINT: Let $h = 0$ in your answer to Problem 3.)

12.0