Mathematics 122

Quiz #6 Name: Key

You must show your work to get full credit.

Let a function be given by

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

1. The average rate of change between $t = 2$ and $t = 2 + h$ is

$$\frac{\Delta f}{\Delta t} = \frac{f(2+h) - f(2)}{(2+h) - 2} = \frac{f(2+h) - f(2)}{h}.$$

Simplify this with the goal of canceling the h out of the denominator.

$$\frac{f(2+h) - f(2)}{h} = 13 + 3h$$

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

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

$$= \frac{h(13+3h)}{h} = 13+3h$$

2. Use your formula, or your calculator, to compute the following

(a) The average rate of change of $f(x)$ between $t = 2$ and $t = 2.1$

Let $h = .1$ in prob 1 — 13.3

(b) The average rate of change of $f(x)$ between $t = 2$ and $t = 2.01$

Let $h = .01$ in Prob. 1 — 13.03

(c) The average rate of change of $f(x)$ between $t = 2$ and $t = 2.001$

Let $h = .001$ in Prob 1 — 13.003

3. What is the instantaneous rate of change, $f'(2)$?

Let $h = 0$ in prob. 1 $f'(2) =$ 13.