Mathematics 122

Quiz 2 Name: Key

You must show your work to get full credit.

1. Let $D(t)$ be defined by

$$D(t) = t^2.$$

(a) What is the average rate of change of D between $t = 3$ and $t = 3.1$?

The average rate is 6.1

$$\frac{D(3.1) - D(3)}{3.1 - 3} = \frac{9.61 - 9}{.1} = \frac{.61}{.1} = 6.1$$

(b) What is the averate rate of change of D between $t = 3$ and $t = 3.01$?

The average rate is 6.01

$$\frac{D(3.01) - D(3)}{3.01 - 3} = \frac{(3.01)^2 - 3^2}{.01} = \frac{.0601}{.01} = 6.01$$

(c) What is the averate rate of change of D between $t = 3$ and $t = 3.001$?

The average rate is 6.001

$$\frac{D(3.001) - D(3)}{3.001 - 3} = \frac{(3.001)^2 - 3^2}{.001} = \frac{.006001}{.001} = 6.001$$

(d) What is the average rate of change of D beteen $t = 3$ and $t = 3 + h$?

The average rate is $6 + h$.

$$\frac{D(3+h) - D(3)}{3+h-3} = \frac{(3+h)^2 - 3^2}{h} = \frac{9 + 6h + h^2 - 9}{h}$$

$$= \frac{h(6+h)}{h} = 6 + h$$

(e) What is the average rate of change of D between t and $t + h$?

The average rate is

$$\frac{D(t+h) - D(t)}{t+h-t} = \frac{(t+h)^2 - t^2}{h} = \frac{t^2 + 2th + h^2 - t^2}{h}$$

$$= \frac{h(2t+h)}{h} = 2t + h$$