

Math 121C
Fall 2009

Applied Calculus I
Quiz 4

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Write your name on this quiz

Consider the function $C(x) = x^2 + 2x + 5$.

1. Find the average rate of change of this function from $x = 2$ to $x = 5$.

$$\frac{C(5) - C(2)}{5 - 2} = \frac{40 - 13}{3} = \frac{27}{3} = 9$$

2. Find the instantaneous rate of change of C at the point $x = 3$, using the limit definition of the derivative. (This means find $C'(3)$, but you must use the limit definition).

$$C(3+h) = (3+h)^2 + 2(3+h) + 5 = 9 + 6h + h^2 + 6 + 2h + 5 \\ = 20 + 8h + h^2$$

$$C(3+h) - C(3) = 20 + 8h + h^2 - 20 = 8h + h^2$$

$$\frac{C(3+h) - C(3)}{h} = \frac{8h + h^2}{h} = 8 + h \quad \left| \quad \lim_{h \rightarrow 0} \frac{C(3+h) - C(3)}{h} = \lim_{h \rightarrow 0} (8+h) \right.$$

3. (Bonus) If $C(x)$ represents the cost in dollars to produce x hair scrunchies, then interpret your answers to questions 1 and 2. (This means, say in words what your answers signify).

8

In ①, the answer "9" means that, on average, the cost to produce scrunchies was going up by about \$9/scrunchie between producing 2 & 5 scrunchies.

In ②, we expect the fourth scrunchies made to cost about \$8 more than the first scrunchie.