

## Quiz #3

MATH 105 – Amber Buntin – Fall 2015

Directions: Please **show as many steps as possible** while computing the following limits and use proper limit notation. Also, use the **average rate of change formula** for number 2..

1. (5 points each) Evaluate the following limit  $\lim_{x \rightarrow 3} \frac{-4x}{x-3}$  by computing the left and right-hand limits

a.  $\lim_{x \rightarrow 3^-} \frac{-4x}{x-3}$   $\frac{+}{-}$

$$\approx \frac{-4(2.99)}{2.99-3}$$

$$\approx \frac{-12}{-small} = \boxed{\infty}$$

c.  $\lim_{x \rightarrow 3} \frac{-4x}{x-3} = \boxed{DNE}$

b.  $\lim_{x \rightarrow 3^+} \frac{-4x}{x-3}$   $\frac{-}{+}$

$$\approx \frac{-4(3.001)}{3.001-3}$$

$$\approx \frac{-12}{+small}$$

$$= \boxed{-\infty}$$

Recall

$$\frac{\pm \#}{\pm small} = \pm BIG$$

$$\frac{\pm \#}{\pm BIG} = \pm small$$

→ Since  $\lim_{x \rightarrow 3^-} \frac{-4x}{x-3} \neq \lim_{x \rightarrow 3^+} \frac{-4x}{x-3}$

the left & right limits are not equal.

2. (5 points) Compute **average rate of change**,  $f(x) = -3x^2 + 4x$ , from  $x=2$  to  $x=5$ .

$$Ave_{ROC} = \frac{f(b) - f(a)}{b - a}$$

$$= \frac{f(5) - f(2)}{5 - 2}$$

$$= \frac{-55 - (-4)}{3}$$

$$= \frac{-55 + 4}{3}$$

$$= \frac{-51}{3} = \boxed{-17}$$

$$f(b)$$

$$\boxed{f(5)} = -3(5)^2 + 4(5)$$

$$= -3(25) + 20$$

$$= -75 + 20$$

$$= -55$$

$$f(2)$$

$$f(2) = -3(2)^2 + 4(2)$$

$$= -3(4) + 8$$

$$= -12 + 8$$

$$= -4$$