

MATH 141 (Section 5 & 6)  
Prof. Meade

University of South Carolina  
Fall 2013

Quiz 4  
September 18, 2013

Name: Key  
Section: 005 / 006 (circle one)

1. (5 points) Evaluate  $\lim_{x \rightarrow \infty} \frac{4x+3}{x-5}$ .

$$= \lim_{x \rightarrow \infty} \frac{x(4 + \frac{3}{x})}{x(1 - \frac{5}{x})}$$

$$= \lim_{x \rightarrow \infty} \frac{4 + \frac{3}{x}}{1 - \frac{5}{x}}$$

$$= \frac{\lim_{x \rightarrow \infty} 4 + \frac{3}{x}}{\lim_{x \rightarrow \infty} 1 - \frac{5}{x}} = \frac{4}{1} = 4.$$

2. (5 points) Explain why the function  $f(x) = \begin{cases} x^2, & \text{if } x < 0 \\ e^x, & \text{if } x \geq 0 \end{cases}$  is discontinuous at  $a = 0$ .

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} e^x = 1$$

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} x^2 = 0$$

since these one-sided limits  
are not equal,

$$\lim_{x \rightarrow 0} f(x) \text{ dne,}$$

so  $f$  cannot be  
continuous at  $x=0$ .