

Math 157 - Quiz 3

September 7, 2016

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. YOU MUST WORK INDIVIDUALLY.

1. (3 points) Use a table of values to estimate the following limit. Your table must show function values at six or more points.

$$\lim_{x \rightarrow 0} \frac{e^{-3x} - 1}{x}$$

x	$\frac{e^{-3x} - 1}{x}$
0.1	-2.5918
0.01	-2.9554
0.001	-2.9955
-0.1	-3.4986
-0.01	-3.0455
-0.001	-3.0045

Looks LIKE

$$\lim_{x \rightarrow 0} \frac{e^{-3x} - 1}{x} = \boxed{-3}$$

2. (2.5 points) Use algebra to find the limit analytically.

$$\lim_{x \rightarrow 2} \frac{3x - 6}{2x^2 + x - 10}$$

$\frac{0}{0}$ NONSENSE

$$\lim_{x \rightarrow 2} \frac{3(x-2)}{(x-2)(2x+5)} = \lim_{x \rightarrow 2} \frac{3}{2x+5} = \frac{3}{9} = \boxed{\frac{1}{3}}$$

3. (2.5 points) Use algebra to find the limit analytically.

$$\lim_{r \rightarrow -1} \frac{3(r+2)^2 + 6r + 3}{r+1}$$

$\frac{0}{0}$ NONSENSE

$$\lim_{r \rightarrow -1} \frac{3(r^2 + 4r + 4) + 6r + 3}{r+1}$$

$$= \lim_{r \rightarrow -1} \frac{3r^2 + 18r + 15}{r+1} = \lim_{r \rightarrow -1} \frac{3(r+1)(r+5)}{r+1}$$

$$= \lim_{r \rightarrow -1} 3(r+5) = \boxed{12}$$

4. (2 points) Let $f(x) = (x^2 + 3)\ln(x+1)$. Compute the limit of $f(x)$ as $x \rightarrow 3$.

CAN GET THE LIMIT BY "plugging in"

$$\lim_{x \rightarrow 3} f(x) = (3^2 + 3)\ln 4$$

$$= \boxed{12 \ln 4 \approx 16.6}$$