MAT265 Homework 01

Due Date: January 27, 2015 Name: _____

Instructions: The following exercises are similar to those found in the course text book [related text book question are in brackets]. Show ALL your work and write neatly. This assignment is due at the beginning of the class period on the date above. Group work is allowed and encouraged, but each member must write up his/her own solutions. Submissions without staples, without a name, or without work shown *will not receive credit*.

1. [§1.3, #6] Sketch the graph of the following function and use it to determine values of a for which $\lim_{x\to a} f(x)$ exists.

$$f(x) = \begin{cases} \cos x & \text{if } x < 0 \\ \sin x & \text{if } 0 \le x \le \pi \\ 1 + \cos x & \text{if } x > \pi \end{cases}$$

2. [§1.3, #18] Use a table of values to estimate the value of the limit. If you have a graphing device, use it to confirm your result graphically.

$$\lim_{x\to 0} \frac{11^x - 3^x}{x}$$

3. [§1.4, #10]

a. What is wrong with the following equation?

$$\frac{x^2 - 9}{x - 3} = x + 3$$

b. In view of part (a), explain why the equation

$$\lim_{x\to 3} \left(\frac{x^2 - 9}{x - 3} \right) = \lim_{x\to 3} (x + 3)$$

is correct.

4. [§1.4, #24] Evaluate the limit, if it exists.

$$\lim_{t\to 0} \left(\frac{1}{2t^2} - \frac{1}{2t^2 + t^4} \right)$$

5. [§1.4, #26] Evaluate the limit, if it exists.

$$\lim_{x\to -5} \frac{\sqrt{x^2 + 144} - 13}{x + 5}$$

6. [§1.4, #38] Find the limit, if it exists. If the limit does not exist, explain why.

$$\lim_{x\to 5} \frac{3x - 15}{|x - 5|}$$

7. [§1.4, #44] Let

$$g(x) = \begin{cases} 2x & \text{if } x < 0 \\ -2 & \text{if } x = 0 \\ x^2 & \text{if } 0 < x \leq 2 \\ 4 - x & \text{if } x > 2 \end{cases}$$

a. Evaluate each of the following limits, if it exists.

i. $\lim_{x \to 1^-} g(x)$ **iii.** $g(1)$ **v.** $\lim_{x \to 2^+} g(x)$

ii. $\lim_{x \to 1} g(x)$ **iv.** $\lim_{x \to 2^-} g(x)$ **vi.** $\lim_{x \to 2} g(x)$

b. Sketch the graph of g.

8. [§1.5, #31] Find the numbers at which the function

$$f(x) = \begin{cases} x & \text{if } x < 0 \\ 2x^2 - 1 & \text{if } 0 \leq x \leq 1 \\ 4 - 3x & \text{if } x > 1 \end{cases}$$

is discontinuous. At which of these points is f continuous from the right, from the left, or neither? Sketch the graph of f.

9. [§1.5, #33] For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} 3x^2 + cx & \text{if } x < 2 \\ cx^3 - 2x & \text{if } x \geq 2 \end{cases}$$