Math 1210-1
Quiz 1 SOLUTIONS
January 15, 2016

<u>Directions</u>: You may ask and answer each others questions on this quiz. The goal is to understand what you're doing and express your thoughts clearly. Write your own solutions though, rather than just copying someone elses. Calculators are not allowed on this quiz. Show your work.

Find the following limits, or write DNE if they do not exist.

1) Let $f(x)$ be defined piecewise by

$$f(x) = \begin{cases} -2x, & x < 0 \\ 1 + x, & 0 \le x < 1 \\ 2x^2, & x \ge 1 \end{cases}$$

a) $\lim\limits_{x \to 0^+} f(x)$

solution:

$$\lim\limits_{x \to 0^+} f(x) = \lim\limits_{x \to 0^+} 1 + x = 1.$$

b) $\lim\limits_{x \to 0} f(x)$

solution: The limit does not exist, since the left hand limit $\lim\limits_{x \to 0^-} f(x) = \lim\limits_{x \to 0^+} -2x = 0$ *does not equal the right hand limit computed in (a).*

c) $\lim\limits_{x \to 1} f(x)$.

solution: The limit exists and equals 2, since the right hand and left hand limits agree, with that value:

$$\lim\limits_{x \to 1^+} f(x) = \lim\limits_{x \to 1^+} 2x^2 = 2.$$
$$\lim\limits_{x \to 1^-} f(x) = \lim\limits_{x \to 0^+} 1 + x = 2.$$

(6 points)

2) Carefully sketch the graph $y = f(x)$ for the function $f(x)$ in problem 1.

(4 points)

solution: