Math 131 - September 5, 2014
Solutions

Warm-up Problems

1. Compute

$$\lim_{x\to -1} \frac{x^2-1}{|x|-1} = 2$$

2. Compute. Use a table, graph, etc.

   (a) $\lim_{x\to 0^+} \frac{1}{x} = \infty$
   (b) $\lim_{x\to 0^-} \frac{1}{x} = -\infty$
   (c) $\lim_{x\to 0} \frac{1}{x} = \text{DNE}$
   (d) $\lim_{x\to 0^+} \frac{1}{x^2} = \infty$
   (e) $\lim_{x\to 0^-} \frac{1}{x^2} = \infty$
   (f) $\lim_{x\to 0} \frac{1}{x^2} = \infty$

Lecture Problems

3. Suppose you know the following:

$$\lim_{x\to 1} f(x) = 4$$
$$\lim_{x\to 1} g(x) = 7$$
$$\lim_{x\to 1} h(x) = 0$$

   Find the following

   (a) $\lim_{x\to 1} f(x)\cdot g(x) = 28$
   (b) $\lim_{x\to 1} f(x)\cdot h(x) = 0$
   (c) $\lim_{x\to 1} f(x) + h(x) - g(x) = -3$
   (d) $\lim_{x\to 1} f(x)/g(x) = 4/7$
   (e) $\lim_{x\to 1} h(x)/g(x) = 0$
   (f) $\lim_{x\to 1} f(x)/h(x) = \text{DNE}$

4. Suppose you know that

$$2 - x^2 \le g(x) \le 2\cos x$$

   for all x. Find $\lim_{x\to 0} g(x)$.

   Solution: Use the squeeze theorem to get 2

5. Find the limits

   (a) $\lim_{x\to 0} x^2 e^{\sin(1/x)}$
   Solution: Use squeeze theorem: 0

   (b) $\lim_{x\to 0} x^3 \sin(1/\sqrt[3]{x})$
   Solution: Use squeeze theorem: 0

6. Play the *limit game* with a partner for the following limits.

   (a) $\lim_{x\to 5} 3x = 15$

   (b) $\lim_{x\to 3} -2x = -6$

   (c) $\lim_{x\to -1} 3x + 1 = -2$

   (d) $\lim_{x\to 1} 3x = 5$

   (e) $\lim_{x\to 13} -2x + 7 = 19$

   (f) (More difficult) $\lim_{x\to 1} x^2 = 1$

   (g) (More difficult) $\lim_{x\to 2} x^2 = 4$

   (h) (More difficult) $\lim_{x\to 2} x^2 - x + 1 = 3$