Math 131 - February 1, 2015
Solutions

Warm-up Problems

1. Describe our method for finding limits (as described in class).

   (a) Try plugging in.
   (b) Try using algebra.
   (c) Try some trick (Squeeze Theorem).
   (d) Make a table or graph.

2. List the limit laws learned in class and the book.

   Solution:

   - $\lim_{x\to a}[f(x)+g(x)] = \lim_{x\to a} f(x) + \lim_{x\to a} g(x)$
   - $\lim_{x\to a}[f(x)-g(x)] = \lim_{x\to a} f(x) - \lim_{x\to a} g(x)$
   - $\lim_{x\to a} cf(x) = c\lim_{x\to a} f(x)$
   - $\lim_{x\to a} f(x)g(x) = \lim_{x\to a} f(x) \cdot \lim_{x\to a} g(x)$
   - $\lim_{x\to a} \dfrac{f(x)}{g(x)} = \dfrac{\lim_{x\to a} f(x)}{\lim_{x\to a} g(x)}$
   - $\lim_{x\to a}[f(x)]^n = \left[\lim_{x\to a} f(x)\right]^n$
   - $\lim_{x\to a} x = a$
   - $\lim_{x\to a} c = c$

Lecture Problems

3. Given the following:

   $$\lim_{x\to 2} f(x) = 4 \qquad \lim_{x\to 2} g(x) = 2 \qquad \lim_{x\to 2} h(x) = 0$$

   Find the following:

   (a) $\lim_{x\to 2} f(x) - 3g(x) = -2$
   (b) $\lim_{x\to 2} \frac{(f(x))^3+1}{g(x)+3h(x)} = 65/2$
   (c) $\lim_{x\to 2} \frac{f(x)-2g(x)}{h(x)} =$ UNKNOWN
   (d) $\lim_{x\to 2} \frac{f(x)-g(x)}{h(x)} = \pm\infty$
   (e) $\lim_{x\to 2} \frac{h(x)}{f(x)-g(x)} = 0$
   (f) $\lim_{x\to 2} \sqrt{8f(x)-g^2(x)} = \sqrt{28}$

4. Find the following limits (infinite limits)

(a) $\lim_{x\to 0} \frac{1}{x^2} = \infty$

(b) $\lim_{x\to 0} \frac{1}{-x^2} = -\infty$

(c) $\lim_{x\to 0} \frac{1}{x} = DNE$

(d) $\lim_{x\to 0^-} \frac{1}{x} = -\infty$

(e) $\lim_{x\to 0^+} \frac{1}{x} = \infty$

(f) $\lim_{x\to 4} \frac{1}{x^2-16} = DNE$

(g) $\lim_{x\to 4^+} \frac{1}{x^2-16} = \infty$

5. Determine the points where the function graphed below is continuous and discontinous. Be sure to be able to explain why the function is continuous or discontinuous.