Math 131 - January 29, 2015
Solutions

Warm-up Problems

1. Rationalize the denominator (get the square root out of the denominator using algebra):

   (a) $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

   (b) $\frac{1}{1-\sqrt{3}} = -\frac{1+\sqrt{3}}{2}$

   (c) $\frac{1}{\sqrt{2}+\sqrt{5}} = \frac{\sqrt{5}-\sqrt{2}}{3}$

Lecture Problems

2. Compute the limits by plugging in. If that fails, try manipulating algebraically. If that fails, try making a table of values.

   (a) $\lim_{x\to 5} x^3 - 2x + 1 = 116$

   (b) $\lim_{x\to 3} \sin x = \sin 3$

   (c) $\lim_{x\to 2} \frac{x^2-2x+7}{x^2+1} = 7/5$

   (d) $\lim_{x\to 5} \frac{x^2-6x+5}{x-5} =$

   (e) $\lim_{x\to -2} \frac{x+2}{x^3+8} = 1/12$

   (f) $\lim_{x\to 3} \frac{\frac{1}{x}-\frac{1}{3}}{x-3} = -1/9$

   (g) $\lim_{x\to 16} \frac{4-\sqrt{x}}{16x-x^2} = 1/128$

   (h) $\lim_{x\to 1} \frac{x-1}{\ln x} = 1$

   (i) $\lim_{x\to 0} \frac{x}{e^x-1} = 1$

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) $\lim_{x\to 2} \sqrt{8f(x) - g^2(x)} = \sqrt{28}$