My Office Hours: M & W 2:30–4:00, Tu 2:00–3:30, & F 1:30–2:30 or by appointment. Math
Intern: Sun: 2:00–5:00, 7:00–10:pm; Mon thru Thu: 3:00–5:30 and 7:00–10:30pm in Lansing 310.
Website: http://math.hws.edu/~mitchell/Math131F15/index.html.

Practice

1. Review L'Hopital’s Rule in Section 4.7 and the online notes. More interesting ones have the form $0 \cdot \infty$, $0^0$, $\infty^0$, and $\infty - \infty$.
   (a) Read all of 7.7 on improper integrals which we continue to discuss next time.

   (b) Interesting ones of the form $0 \cdot \infty$, $0^0$, $\infty^0$, and $\infty - \infty$. Page 307ff #45, 49, 53, 55, 65, and 67.

Hand In

These should be quick. Some are WeBWorK problems. Potential answers: $k$, $k^2$, $0$, $1$, $2$, $1/2$, $1/4$, $\ln 2$, $\ln 3$, $e^2$, $e^{-2}$, diverges, $e$.

0. Start WeBWorK Day27—many of these are the same as the hand in problems—and finish Day26.

1. Evaluate these limits using L'Hôpital’s Rule when appropriate. In part (b), $k$ is a non-zero constant. Use correct limit notation.

   (a) $\lim_{x \to 0^+} x^2 \ln x$ WeBWorK
   (b) $\lim_{x \to \infty} x \tan(\frac{1}{x})$ WeBWorK
   (c) $\lim_{x \to \infty} \left(1 - \frac{2}{x}\right)^x$ WeBWorK
   (d) $\lim_{x \to 0^-} \frac{\sin kx}{\arcsin x}$
   (e) $\lim_{x \to 0^+} x^{3x}$ WeBWorK
   (f) $\lim_{x \to \infty} \ln(2x - 2) - \ln(x + 7)$ WeBWorK

2. Page 578 #6. Use correct limit notation. Similar to a WeBWorK problem.

3. Determine $\int_0^\infty \frac{4}{\sqrt{x+1}} \, dx$. Use correct limit notation. Similar to a WeBWorK problem.

4. Determine $\int_0^\infty 2xe^{-x^2} \, dx$. Use correct limit notation.

5. Determine $\int_0^\infty \frac{4}{1+x^2} \, dx$. Use correct limit notation.

6. Suppose that a tank is formed by rotating the region in the first quadrant enclosed by $y = (x + 2)^2$, the $y$-axis, and the $x$-axis about the $y$-axis (see Figure 1).
   Just set up the integral for the work done pumping the oil ($D = 60\, \text{lbs/ft}^3$)
   to a height 3 feet above the top of the tank if there is only 1 foot of oil in the tank.

7. BONUS: Determine $\lim_{x \to 0^+} (\tan x)^x$. Hint: Use the "log process." After applying
   L'Hôpital’s Rule the first time, simplify and apply again. (Also a WeBWorK Bonus problem.)

Figure 1: The circular cross-section formed by rotating the point $(x,y)$ about the $y$-axis.