Part I

Read definition 2 on the pink Improper Integrals handout. You don't have to turn anything in for Part I this time.

Part II: Exercises (prepare for class Friday, February 23)

1. Try out logarithmic differentiation to find these derivatives:
   (a) $\dfrac{d}{dx}x^x$
   (b) $\dfrac{d}{dx}x^{e^x}$
   (c) $\dfrac{d}{dx}(\sin x)^{x^3}$
   (d) $\dfrac{d}{dx}\dfrac{(x-2)^2}{\sqrt{x^2+1}}$ for $x \neq 2$ (Note that while logarithmic differentiation isn't *necessary* for this problem, it does make things much easier.)
2. Finish Example 2 and try Example 3 on the pink Improper Integrals handout.

Part III: Homework Problems (due Wednesday, March 6 at the beginning of class)

Review the guidelines and Sample Homework in the syllabus to make sure your Part III solutions follow them.

1. The Marqui de l'Hôpital first published the rule that bears his name in his book *Analyse des infiniment petits*, which was the original calculus textbook. In the book, he illustrated the rule by finding the following limit:
$$\lim_{x\to a}\frac{\sqrt{2a^3x-x^4}-a\sqrt[3]{aax}}{a-\sqrt[4]{ax^3}}.$$
   Find this limit.
2. Construct an example of the thing described in each of the following. Make your examples different from the examples on the indeterminate forms handout. Also, while you are welcome (encouraged, even!) to work with your classmates on homework and discuss possible examples, **everyone should create their own**—you should not have the exact same examples as your classmates.
   (a) A limit of the indeterminate form $\frac{0}{0}$ that approaches infinity.
   (b) A limit of the indeterminate form $\frac{0}{0}$ that equals 0.
   (c) A limit of the indeterminate form $\frac{0}{0}$ that equals π.

mini-Celebration of Learning Friday, February 16

The mini-Celebration of Learning could have problems on choosing an appropriate technique of integration for a particular integral, numerical integration, and indeterminate forms.