Announcements

- This week: 7.8, Midterm Review and 8.1
- Homework # 7A & 7B Due Tonight, Wednesday, November 16, 11:00pm
- Homework # 8A & 8B Due Wednesday, November 23, 11:00pm
- **Midterm # 2, Thursday, November 17** (Covers through section 7.8)
  - One 8.5 x 11 handwritted sheet of notes (both sides)
  - Give Exact Answers! You will lose points if you do not give the exact answer (unless a decimal approximation is asked for).
  - Show all of your work! Correct answers without correct justification will not receive full credit.
  - The only calculator which may be used is the Ti-30x IIS.
  - You may use any of the 20 integrals from the table on p. 495 without justification. Must show your work in evaluating any other integrals. (except $\sec^3 x$) even if they are on your note sheet.

Today

- Review L'Hospital's rule
- Review for second Midterm

L'Hospital's rule

Suppose that f and g are differentiable and that $g'(x) \neq 0$ near a (except possibly at a).
Suppose that

$$\lim_{x \to a} f(x) = 0 \quad \text{and} \quad \lim_{x \to a} g(x) = 0$$

or that

$$\lim_{x \to a} f(x) = \pm\infty \quad \text{and} \quad \lim_{x \to a} g(x) = \pm\infty.$$

(In other words we have an indeterminate form of the type $\frac{0}{0}$ or $\frac{\infty}{\infty}$.)

Then

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$$

if the limit on the right side exists or is ∞ or $-\infty$.

1. Compute the following definite integrals:
   - $\int_0^1 (x^2+1)e^{-x}\,dx$
   - $\int_0^{3\pi^2} \cos\sqrt{x+\pi^2}\,dx$
2. Compute the following indefinite integrals:
   - $\int \frac{x^2}{\sqrt{4-x^2}}\,dx$
   - $\int \frac{x^3}{x^2+x+\frac{1}{2}}\,dx$

1. The portion of the graph $y = e^x$ between $x = 0$ and $x = \ln 5$ is rotated about the y-axis to form a container. The container is filled with water. The density of water is 1000kg/m^3, and the acceleration due to gravity is $9.8\ \text{m/s}^2$.

   (a) Write an integral that computes the work required to pump all the water up out of the tank. Do not evaluate the integral.

   (b) Use Simpson's rule with $n = 4$ to approximate the work above.