1. Suppose that $a$ is a positive constant and that $R$ is the region bounded above by $y = 1/x^a$, below by $y = 0$, and on the left by the line $x = 1$.

a) Sketch the curves $y = 1/x^a$ for $a = .5$, 1 and 2. Which of these is closest to the $x$-axis?

b) For which positive numbers $a$ do you get a convergent integral when you attempt to calculate the area of $R$?

c) Same as b), but for the volume of the solid obtained by rotating $R$ around the $x$-axis.

d) Same as c), but for the volume of the solid obtained by rotating $R$ around the $y$-axis.

2. Sketch carefully the graphs of $f(x) = (1 + e^{-x})^2$ and $g(x) = (1 + e^{-2x})^2$ for $x > 0$, and compute how much area there is between them in the first quadrant.

3. Sketch the three-sided region in the first quadrant bounded by the $y$-axis and the two curves $y = \tan x$ and $y = \sec x$. Compute the area of this region.

4. In class we considered the improper integral $\int_1^\infty \frac{\ln(x)}{x^2}dx$. We decided that this integral converges and its value is 1.

a) Make the change of variable $w = \ln x$ and remember also to change the bounds on the definite integral. What is the resulting definite integral and what is its value?

b) Make the change of variable $w = \frac{1}{x}$ in the original integral and remember also to change the bounds on the definite integral. What is the resulting definite integral and what is its value?

**About these workshop problems** The second and third problems are taken from past Calc 2 exams. The answer to the fourth problem's part a) resembles a problem on the exam you just had.

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One problem will be selected for a writeup to be handed in at the next recitation meeting. Please see Professor Greenfield's Math 152 webpage to learn which problem to hand in.