Math 263B **Guide for Test 4**

Here are some sample questions from sections 7.2, 7.5, 7.6. Some topics that we covered are not represented by these questions, but are still fair game.

1. Compute the volume obtained by rotating the region enclosed by the curves $y = (x-1)^2$ and $y = x + 1$ about the y-axis.
2. Show that the volume of a sphere of radius R is $(4/3)\pi R^3$.
3. Hooke's law is that a spring stretched or compressed by x will exert a force with magnitude kx, where k is the spring constant. Suppose a particular spring exerts a force with magnitude 8 N when stretched 5 m. How much work does it take to compress it 2 m?
4. Find the mass and center of mass of a 4-m rod whose density varies linearly from 5 kg/m to 3 kg/m.
5. Find the function y that satisfies the differential equation $y' = \dfrac{e^{3+t}}{y}$ and the initial condition $y(0) = 2$.
6. That one pond in your home town has become contaminated with a (soluble) polutant at concentration 3 grams/liter. The pond has volume of 50000 liters. Clean rainwater flows into the pond and the average flow rate of the stream leading out of its spillway is 4 liter/minute. How long will it take until the concentration lowers to 1 grams/liter?