Homework Set 22

(sect 7.2 & 7.3: Volume)

1. Let S be the solid obtained by rotating the region bounded by $y = x^2(3 - x)$ and $y = 0$ about the y-axis. Find the volume V of S by using the shell method. It may be helpful to draw a picture of the situation. Explain why it would have been awkward to use slices to find V.

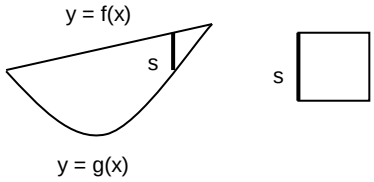
2. Consider the region bounded by $y = x^3$ and $y = x$ in the first quadrant. Find the volume of the solid obtained by rotating this region about the x-axis.
    a. Use cylindrical shells to find this volume.

    b. Use slices to find this volume.

    c. Which method do you prefer? Why?

3. Use the shell method to find the volume of the solid obtained by rotating the region bounded by $y = 5x - x^2$ and $y = x$ about the y-axis. (Hint: draw a picture of the situation and label where the height and radius of the cylinders are located.)

4. The base of a certain solid is the area bounded above by the line $y = f(x) = x + 2$ and below by the curve $y = g(x) = x^2 - 4$. The cross-sections perpendicular to the x-axis are squares. (see figures to the right)



Use the formula $V = \int_a^b A(x)\,dx$ to find the volume of the solid.

The side of the square cross-section is a function of x, given by $s(x) =$

$a =$

$b =$

$A(x) =$

Thus, the volume of the solid is $V =$