Homework 9/31  
Math 175 - Fall 2009

1. §6.1: Problems 13 and 15. Show work for all of the following steps.
   (a) Choose an axis of integration and write down your choice.
   (b) Draw a typical slice of volume and label its dimensions.
   (c) Find the volume of this slice. Write it in terms of the integration variable.
   (d) Express the total volume as an integral or a sum of integrals. If you use more than one integral, repeat (b) and (c) as needed.
   (e) Compute the integral(s).

2. §6.1: Problem 13. As above, but rotate the region about the $y$-axis.

3. §6.1: Problem 15*. Rotate the region about the $x$-axis. Complete steps (a)–(d) as above.

4. §6.1: Problem 13. Complete the usual steps but this time rotate the region about the line $x = -1$.

5. §6.1: Problem 15*. Rotate the region about the line $y = 1$. Complete steps (a)–(d) as above.

Hints and Answers

2. $\frac{4\pi}{3}$

3. $\int_0^1 \left( \pi - \frac{16}{\pi} \arctan x^2 \right) \, dx \approx 1.89$

4. $\frac{10\pi}{3}$

5. $\int_0^1 \pi \left[ 1 - \frac{4}{\pi} \arctan x \right]^2 \, dx \approx 0.880$

*The asterisk denotes a Type 2 integration. Recall the instructions on my website for Type 2 problems. If you want to check your answer against mine you need to use your calculator or a computer to get a numerical approximation of the integral in step (d).

On an exam or in graded homework I will consider the problem complete if you complete steps (a)-(d) correctly. For this assignment only, I’ve included symbolic answers for part (d).