Homework 1: Due April 9th, 2018

First, do these problems. These will be graded for completion. You must show enough work to convince the grader that you didn’t just copy the answer.

- 5.1: 1c, 6, 7, 9, 13, 14
- 5.2: 1d, 5, 8, 9

Then do these problems. These will be graded for correctness.

1. Let $f(x, y)$ represent the velocity of water (in m/s) flowing through a particular point on a aqueduct. What are the units of $\int \int_R f(x, y) \, dx \, dy$, integrated over the slice of the aqueduct as pictured? What does the quantity represent?

2. Use Cavalieri’s Principle (the slice method) to explain why

$$\int \int_R f(x, y) \, dx \, dy = \int_a^b \left[ \int_c^d f(x, y) \, dx \right] \, dy = \int_c^d \left[ \int_a^b f(x, y) \, dy \right] \, dx$$

(Note, that this is not a proof of Fubini’s theorem, as we weren’t rigorous about Cavalieri’s principle, but it is a good explanation of Fubini’s theorem.)

3. 5.2:17. Do not bother doing the integral. Rather, focus on the explanation. (On the other hand, doing the integral might help you understand why it doesn’t contradict Fubini’s theorem.)