WORKSHEET 5 - CHAPTER 15 (DUE TUES, MAR 31)

Math 2110Q – Spring 2015
Professor Hohn

You must show all of your work to receive full credit!

1. Find the volume of the solid bounded by the planes $z = x, y = x, x + y = 2, x = 0$, and $z = 0$.

2. Evaluate the integral
$$\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{y^3 + 1} \, dy \, dx$$
by reversing the order of integration.

3. Evaluate the integral
$$\int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} \cos(x^2)\, dx\, dy$$
by reversing the order of integration.

4. An alien that is new to our planet (and, hence, new to our crazy calculus rules) is uncertain if the following equations are true. If one is true, explain why. If one is false, explain why or give a counterexample that disproves the statement.

(a)

$$\int_{-1}^{2} \int_{0}^{6} x^2 \sin(x-y) \, dx \, dy = \int_{0}^{6} \int_{-1}^{2} x^2 \sin(x-y) \, dy \, dx$$

(b)

$$\int_{0}^{1} \int_{0}^{x} \sqrt{x+y^2} \, dy \, dx = \int_{0}^{x} \int_{0}^{1} \sqrt{x+y^2} \, dx \, dy$$

4

(c)

$$\int_1^2 \int_3^4 x^2 e^y \, dy \, dx = \int_1^2 x^2 \, dx \int_3^4 e^y \, dy$$

5. Calculate the value of the integral
$$\iint_D \frac{1}{1+x^2}\, dA,$$
where D is the triangular region with vertices $(0,0)$, $(1,1)$, and $(0,1)$.