Name: ______________________

Score: ________ /15

WORKSHEET 6 - CHAPTER 15 (DUE TUES, APR 7)

Math 2110Q – Spring 2015
Professor Hohn

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

1. Calculate the value of the integral

$$\iint_D x\,dA$$

where D is the region in the first quadrant between the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 2$.

2. Evaluate the integral

$$\int_0^2 \int_0^{\sqrt{2x-x^2}} \sqrt{x^2+y^2}\, dy\, dx$$

by converting to polar coordinates.

3. Evaluate the integral

$$\int_0^a \int_{-\sqrt{a^2-y^2}}^0 x^2 y \, dx \, dy$$

by converting to polar coordinates.

4. We define the improper integral (over the entire plane $\mathbb{R}^2$)

$$\iint\limits_{\mathbb{R}^2} e^{-(x^2+y^2)}\, dA = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-(x^2+y^2)}\, dA = \lim_{a\to\infty} \iint\limits_{D_a} e^{-(x^2+y^2)}\, dA$$

where D_a is the disk with radius a and center at the origin. Show that

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-(x^2+y^2)}\, dA = \pi.$$

5. Use a double integral to find the area of the region inside the cardioid $r = 1 + \cos\theta$ and outside the circle $r = 3\cos\theta$.