Graded by: _____ Score: _____ ID: _____

WORKSHEET 8 - DUE 11/11

MATH 2110Q – Fall 2015
Professor Hohn

You must show all of your work for full credit. Please circle/box your answers or write a brief sentence indicating your answer.

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1. Evaluate the integral

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

by converting to polar coordinates.

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

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

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

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

3. Evaluate the triple integral

$$\iiint_E xy\,dV$$

where E is bounded by the parabolic cylinders $y = x^2$ and $x = y^2$ and the planes $z = 0$ and $z = x + y$.

4. Convert the following into an integral in cylindrical coordinates.

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