University of Delaware
Department of Mathematical Sciences

MATH-243 – Analytical Geometry and Calculus C
Instructor: Marco A. Montes de Oca
Spring 2012

Homework 13

Name: _____ **Section:** _____

Due date: April 19, 2012 (Section 50)
April 18, 2012 (Section 51)

Problems

Taken or adapted from the book *MATH 241/242/243 University of Delaware* by J. Stewart. Each exercise is worth 20 points for a total of 100 points.

1. A lamina occupies the part of the disk $x^2 + y^2 \leq 1$ in the first quadrant. Find its center of mass if the density at any point is proportional to its distance from the $x-$axis.

2. Find the mass of the lamina that occupies the region D bounded by the parabola $x = 1 - y^2$ and the coordinate axes in the first quadrant with density function $\rho(x, y) = y$.

3. Use polar coordinates to evaluate $\displaystyle\int_0^3 \int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}} (x^3 + yx^2) dy dx$.

4. Use the transformation $x = \frac{1}{4}(u + v)$ and $y = \frac{1}{4}(v - 3u)$ to evaluate the integral $\displaystyle\iint_R (4x + 8y)\mathrm{d}A$, where R is the parallelogram with vertices $(-1, 3)$, $(1, -3)$, $(3, -1)$,$(1, 5)$.

5. Evaluate the integral $\displaystyle\iint_R (x + y)e^{x^2 - y^2}\mathrm{d}A$ by making an appropriate change of variables. The region R is the rectangle enclosed by the lines $x - y = 0$, $x - y = 2$, $x + y = 0$, $x + y = 3$.