University of Delaware
Department of Mathematical Sciences

MATH-243 – Analytical Geometry and Calculus C
Instructor: Dr. Marco A. MONTES DE OCA
Spring 2013

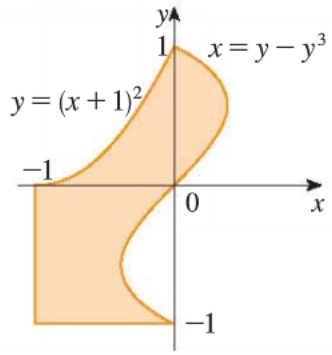
Homework 8

Due date: April 8, 2013

Problems

Based on Sections 15.1–15.4 of the book *Calculus: Early Transcendentals* 7th edition by J. Stewart.

1. If $f(x,y) = k$, and $R = \{(x,y) \,|\, a \le x \le b,\ c \le y \le d\}$, show that $\iint_R f(x,y)\,dA = k(b-a)(d-c)$.
2. Calculate $\int_0^1 \int_0^3 e^{x+3y}\,dx\,dy$.
3. Calculate $\iint_R \dfrac{x}{1+xy}\,dA$, $R = [0,1] \times [0,1]$.
4. If $f(x,y)$ is continuous on $[a,b] \times [c,d]$ and $g(x,y) = \int_a^x \int_c^y f(s,t)\,dt\,ds$ for $a < x < b$, $c < y < d$, show that $g_{xy} = g_{yx} = f(x,y)$.
5. Evaluate $\int_0^2 \int_y^{2y} xy\,dx\,dy$.
6. Evaluate $\iint_D xy\,dA$, where D is the region enclosed by the curves $y = x^2$ and $y = 3x$.
7. Find the volume of the solid by subtracting two volumes. The solid enclosed by the parabolic cylinder $y = x^2$ and the planes $z = 3y$, $z = 2 + y$.
8. Sketch the region of integration and change the order of integration of $\int_0^1 \int_{\arctan x}^{\pi/4} f(x,y)\,dy\,dx$.
9. By decomposing D into the union of simpler regions, evaluate $\iint_D y\,dA$, where D is depicted below.



10. By changing from Cartesian to polar coordinates, evaluate $\iint_D xy\,dA$, where D is the top half of the disk centered at the origin and with radius 4.