

University of Delaware
Department of Mathematical Sciences

MATH-243 – Analytical Geometry and Calculus C
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Fall 2012

Homework 7

Due date: October 16, 2012

Problems

Based on Sections 14.1, 14.2, and 14.3 of the book *Calculus: Early Transcendentals* 7th edition by J. Stewart.

1. Find and sketch the domain of $\frac{\sqrt{y-x^2}}{1-x^2}$.
2. Evaluate the function $f(x, y) = \int_x^y (2t + \sin(t)) dt$ at $(0, 1)$ and $(4, \pi)$.
3. Use a graphing utility to plot the functions $f(x, y) = \sqrt{x^2 + y^2}$, $f(x, y) = e^{\sqrt{x^2 + y^2}}$, $f(x, y) = \ln(\sqrt{x^2 + y^2})$, $f(x, y) = \sin(\sqrt{x^2 + y^2})$, and $f(x, y) = \frac{1}{\sqrt{x^2 + y^2}}$ (attach printouts).

In general, if g is a function of one variable, how is the graph of $f(x, y) = g(\sqrt{x^2 + y^2})$ obtained from the graph of g ?

4. Find the limit $\lim_{(x,y) \rightarrow (0,0)} \frac{x+y}{x^2+y}$.
5. Find the limit $\lim_{(x,y) \rightarrow (1,1)} \frac{xy-1}{xy+1}$.
6. Find the limit $\lim_{(x,y,z) \rightarrow (0,0,0)} \frac{xy+yz+xz}{x^2+y^2+z^2}$.
7. Find the first order partial derivatives of $f(x, y) = \frac{e^y}{x+y^2}$ and $f(x, y) = \int_x^y \cos(e^t) dt$.
8. Find all the second order partial derivatives of $f(x, y) = x^3y^5 + 2x^4y$, and $f(x, y) = \frac{xy}{x-y}$.

9. Find $\frac{\partial^3 f}{\partial x \partial x \partial x}$ and $\frac{\partial^3 f}{\partial x \partial y \partial x}$ of $f(x, y) = x^4 y^2 - x^3 y$.
10. Verify that $f_{xy} = f_{yx}$ if $f(x, y) = e^{xy} \sin y$.