

Problem Set 7
MA104, Spring 2006
DUE: April 3, 2006
Value: 40 points

Instructor: Dr. Leigh Noble

Assigned: March 28, 2006

Recall that this graded assignment must be accompanied by appropriate documentation as per the USMA *Documentation of Written Work*. The assignment is considered late if not turned in by the beginning of class on the due date.

1. (7 points) $z(x, y) = \sqrt{1 - x^2} + \ln(3y^2)$
 - (a) What is the domain of $z(x, y)$?
 - (b) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ by hand.
2. (7 points) $g(x, y) = \frac{x - 5}{2y^2 - 3} - y^2 + e^{-x^2}$
 - (a) What is the domain of $g(x, y)$?
 - (b) Find g_{xx} and g_{yy} by hand.
3. (18 points) $h(x, y) = \sin(\pi/3)(x - 5)^3 + xy$
 - (a) What is the domain of $h(x, y)$?
 - (b) Find $\frac{\partial h}{\partial x}$ and $\frac{\partial h}{\partial y}$ by hand.
 - (c) Write the exact command(s) you would use to find $\frac{\partial h}{\partial x}$ and $\frac{\partial h}{\partial y}$ in Mathematica. (Hint: try `??D`.)
 - (d) Find h_{xy} and h_{yx} by hand.
 - (e) Write the exact command(s) you would use to find h_{xy} and h_{yx} in Mathematica.
4. (3 points) The symbol $\frac{\partial f}{\partial x}$ means “the partial derivative of f with respect to x ”. Our book indicates there are other notations which mean the same thing. List three of those other notations.
5. (5 points) On the bottom of page 759, our textbook discusses a geometric interpretation of partial derivatives. If $f(x, y)$ is some function of two variables, what is the geometric interpretation of $f_x(a, b)$ *in your own words*?