

MATH 1101/2 (Ng/Fall 2004)

Handout for Partial Derivatives

December 10, 2004.

Problems for Multivariate Functions & Partial Derivatives

1. Find all 1st and 2nd order partial derivatives for the following functions of two variables:

(a) $f(x, y) = x^3y - y^4x$

(b) $f(x, y) = \sin(xy)$

(c) $f(x, y) = e^{-(x^2+y^2)}$

(d) $f(x, y) = \ln(x^2 + y)$

(e) $f(x, y) = \sqrt{x^2 + y^2}$

(f) $f(x, y) = \frac{2x}{y}$

(g) $f(x, y) = y^2 \cos(xy)$

2. Plot, using Plot3D in mathematica, the surfaces of the functions in Prob 1. You may need to plot around with the range of x and y until you can get a decent view.

3. Obtain all distinct second order partial derivatives for the following functions of three variables.

(a) $f(x, y, z) = x^2 + xyz - y^2z$

(b) $f(x, y, z) = e^{x^2 - y^2 - z^2}$

(c) $f(x, y, z) = \sin(xyz)$

(d) $f(x, y, z) = \frac{1}{(xyz)}$

(e) $f(u, v, w) = \ln(u^2 + v^2 + w^2)$

(f) $f(r, s, t) = re^{st} + se^{rt} - te^{rs}$

F.Y.I.:

For all of the above problems, you should feel free and comfortable to use *Mathematica* as a tool to verify your solutions.