Name:_____

Notesheet. Section 8.1: Functions of Several Variables

Math 1220

Definition 1. A real-valued function of two variables f consists of

(a) A set A of

(b) A rule that associates with each ordered pair in the domain of f

Challenge 2. If a principal of P dollars is deposited in an account earning interest at the rate of r/year compounded continuously, then the accumulated amount at the end of t years is given by

$$A = f(P, r, t) = Pe^{rt} \text{ dollars}$$

Find the accumulated amount at the end of 10 years if a sum of $\$10,000$ is deposited in an account earning interest at the rate of 10%/year.

Challenge 3. What is the domain of $f(x, y) = xy$? What about $f(x, y) = \dfrac{1}{xy}$? Finally, what about $f(x, y) = \ln(y + 1) \cdot \sqrt{x - 1}$? Sketch these domains as regions in the xy-plane.

Definition 4. The three-dimensional Cartesian coordinate system is

The graph of a function of two variables is all points of the form

Definition 5. Given a function $f(x, y)$ in two variables, if c is some value of f, then the trace of the graph of f in the plane $z = c$ is

Furthermore, a level curve is

Challenge 6. Sketch the contour map of $f(x, y) = x + y$. What is the domain and range of this function? Find the level curve thta contains the point $(3, 4)$.

Challenge 7. Sketch the contour map of $f(x, y) = x^2 + y^2$. What is the domain and range of this function?