

Course 2E1 2005-06 (SF Engineers & MSISS & MEMS)**S h e e t 2**

Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

Find the function's domain and range:

- (i) $f(x, y) = x$,
- (ii) $f(x, y) = x^2 + 5y^2$,
- (iii) $f(x, y) = \sqrt{x^2 - 4y^2}$,
- (iv) $f(x, y) = \sin(x - 2y)$,
- (v) $f(x, y) = \sqrt{-2x}$,
- (vi) $f(x, y) = x/y^2$.

Note that a function $f(x, y)$ may not explicitly depend on some of the variables.

Exercise 2

Describe the level curves of the functions in Exercise 1.

Exercise 3

Find domain and range and describe level surfaces for the following functions of 3 variables:

- (i) $f(x, y, z) = x + y + z$,
- (ii) $f(x, y, z) = z^3$,
- (iii) $f(x, y, z) = \cos(x^2 + y^2 + z^2)$.

Exercise 4

Find limits:

$$\lim_{(x,y) \mapsto (0,1)} \frac{x-y}{\cos x}, \quad \lim_{(x,y) \mapsto (0,0)} \frac{5x^2 + 10y^2}{\sqrt{x^2 + 2y^2}}, \quad \lim_{(x,y,z) \mapsto (5,0,4)} \sqrt{x^2 + y^2 - z^2}.$$