Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)

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Due: in the exercise sessions next Wednesday/Thursday

Exercise 1

Find the function's domain and range:

(i) $f(x, y) = x - y$,

(ii) $f(x, y) = x^2 + y^2$,

(iii) $f(x, y) = \sqrt{x^2 - y^2}$,

(iv) $f(x, y) = \sin(x + y)$,

(v) $f(x, y) = \sqrt{-x}$,

(vi) $f(x, y) = x/y$.

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

Exercise 2

Describe 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) $f(x, y, z) = x^2$,

(iii) $f(x, y, z) = \sin(x^2 + y^2 + z^2)$.

Exercise 4

Find limits:

$$\lim_{(x,y) \mapsto (0,1)} \frac{x + y}{\cos x}, \quad \lim_{(x,y) \mapsto (0,0)} \frac{5x^2 + 5y^2}{\sqrt{x^2 + y^2}}, \quad \lim_{(x,y,z) \mapsto (5,0,3)} \sqrt{x^2 + y^2 - z^2}.$$