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

Sheet 8

Due: in the tutorial sessions first Wednesday/Thursday of the next term

# Exercise 1

Use Taylor's formula to find linear and quadratic approximation at  $(x_0, y_0) = (0, 0)$ :

(i)  $f(x, y) = x^2 e^y$ ; (ii)  $f(x, y) = x \sin y$ ; (iii)  $f(x, y) = \frac{1}{1+x+y}$ ;

# Exercise 2

Give error estimates for the linear approximations in Exercise 1 for

 $-0.1 \le x \le 0.1, \quad -0.2 \le y \le 0.2.$ 

### Exercise 3

Find parametric equations for the normal line at the given point:

- (i) to the curve  $x^2 + y^3 = 2$  at (1, 1);
- (ii) to the surface  $x \cos y + z = 0$  at (0, 0, 0).

### Exercise 4

Sketch the region of integration and evaluate the integral: (i)

$$\int_0^1 \int_{-1}^1 xy \, dx \, dy$$

(ii)

$$\int_0^1 \int_0^y (x+y) \, dx \, dy$$

(iii)

$$\int_0^1 \int_0^{x^2} y \, dy \, dx$$