

**Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)****S h e e t 6**

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Due: in the tutorial sessions next Wednesday/Thursday

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**Exercise 1**

Find the linearization ( $L(x, y)$  or  $L(x, y, z)$ ) of the function at the given point:

- (i)  $f(x, y) = x^2 + y^2 - 1$  at  $(-1, 1)$ ;
- (ii)  $f(x, y) = e^x \cos y$  at  $(0, \pi)$ ;
- (iii)  $f(x, y, z) = x^2 + y^2 + z^2$  at  $(1, 1, 1)$ ;
- (iv)  $f(x, y, z) = \sqrt{x + y + z}$  at  $(1, 0, 0)$ .

**Exercise 2**

Find all the local maxima, local minima, and saddle points of the functions:

- (i)  $f(x, y) = x^2 - 2x + y^2 + 2y + 3$ ;
- (ii)  $f(x, y) = x^2 + xy - y^2$ ;
- (iii)  $f(x, y) = x^2 + y^3 - 6y + 3$ ;
- (iv)  $f(x, y) = x^4 + y^4 + 4xy$ ;
- (v)  $f(x, y) = \frac{1}{\sqrt{1-x^2-y^2}}$ ;
- (vi)  $f(x, y) = x^2 + \sin y$ .