

**Math 53 Discussion: handout solutions for max, min problems****Practice Problems:** Section 14.7: second derivative test, maximum and minimum points

1) Find the local maximum and minimum values and saddle points of the following functions:

(i)  $f(x, y) = e^x \cos y$

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

(iii)  $f(x, y) = (x - y)(1 - xy)$

2) Find the absolute maximum and minimum values of  $f(x, y) = x^2 + y^2 - 2x$  on the set  $D =$  closed triangular region with vertices  $(2, 0)$ ,  $(0, 2)$  and  $(0, -2)$ .Over  $\rightarrow$

3) Find the shortest distance from the point  $(2, 0, -3)$  to the plane  $x + y + z = 1$ .

4) A cardboard box without a lid is to have a volume of  $32 \text{ cm}^3$ . Find the dimensions that minimize the amount of cardboard used.