MAT 175 HOMEWORK #8

DUE DECEMBER 5 (MONDAY)

Note: *Please indicate you are in* **Section C01**. *Numbering of problems is as in the textbook.*

(12.8.**4**) Let

$$f(x, y) = xy^2 - 6x^2 - 3y^2$$

Find all critical points, indicate whether each such point gives a local maximum or a local minimum, or whether it is a saddle point.

(12.8.**12**) Find the global maximum value and global minimum value of

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

on the set

$$S = \{(x, y) \colon -1 \leqslant x \leqslant 3,\ -1 \leqslant y \leqslant 4\}$$

and indicate the points of S where each of these extreme values occurs.

(12.8.**16**) Find the shortest distance from the origin to the plane

$$x + 2y + 3z = 12.$$

Hint: Similarly as in example we did in class, the calculations will be much simpler if you minimize *the square* of the distance.

(12.9.**2**) Find the maximum of $f(x, y) = xy$ subject to the constraint

$$g(x, y) = 4x^2 + 9y^2 - 36 = 0.$$

(12.9.**8**) Using the method of Lagrange multipliers, find the minimum distance between the origin and the plane

$$x + 3y - 2z = 0.$$

Hint: Here again the calculations will be much simpler if you minimize *the square* of the distance.

(12.9.**22**) Find the maximum and the minimum of the function

$$f(x, y) = x + y - xy$$

on the set

$$S = \{(x, y) \colon x^2 + y^2 \leqslant 9\}.$$

Hint: As in some of the examples we did in class, study first the stationary points (i.e., where $\nabla f = \vec{0}$) in the interior of S, and then the boundary of S using Lagrange multipliers.