B.E. International Program

Faculty of Economics, Thammasat University

EE 320 Introductory Mathematical Economics (Section 046402)

Semester 1/2013

Quiz 5 (b)

Given the function

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

1. (4 point) Write down the first-order necessary conditions and find the stationary points.

Ans.

FONC:

$z_x = -6 - y + 2x = 0$

$z_y = -6 - x + 2y = 0$

⇨ (x*, y*) = (6, 6)

2. (2 points) Determine the value of z evaluated at the stationary points found it part (1).

Ans. z* = 36

3. (4 points) Write down the Hessian matrix, and verify whether the extreme value of z found in part (2) is a maximum or minimum point.

Ans. $[H] = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

➔ $|H_1| = 2 > 0$ and $|H_2| = |H| = \begin{vmatrix} 2 & -1 \\ -1 & 2 \end{vmatrix} = 4 - 1 = 3 > 0.$

Thus, z* is a minimum value.