



B.E. International Program

Faculty of Economics, Thammasat University



EE 320 Introductory Mathematical Economics (Section 046402)

Semester 1/2013

Quiz 5 (a)

Given the function

$$z = f(x, y) = 5x + 5y + xy - x^2 - y^2$$

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

Ans.

FONC:

$$z_x = 5 + y - 2x = 0$$

$$z_y = 5 + x - 2y = 0$$

$$\Rightarrow (x^*, y^*) = (5, 5)$$

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

Ans. $z^* = 25$

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

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

Thus, z^* is a maximum value.