



B.E. International Program

Faculty of Economics, Thammasat University



EE 320 Introductory Mathematical Economics (Section 046401)

Semester 1/2015

Quiz 3 (b) - Answers

Thursday October 29, 2015

Time: 11:15 – 11:35 hrs.

1. Given the utility function

$$U(x, y) = -2x^2 + 4xy - 4y^2 - 40x - 20y + 514$$

- a. (2 points) Find the marginal utility of x (MU_x) and the marginal utility of y (MU_y).

$$\text{Ans. } MU_x = U_x = -4x + 4y - 40$$

$$MU_y = U_y = 4x - 8y - 20$$

- b. (4 points) Find all the second-order partial derivatives, and write the Hessian matrix for the above function.

$$\text{Ans. } H = \begin{bmatrix} -4 & 4 \\ 4 & -8 \end{bmatrix}$$

2. (2 points) Find the total derivative $\frac{dz}{dt}$, given that

$$z = 7u + vt, \text{ where } u = 2t^2 \text{ and } v = t + 1$$

$$\text{Ans. } \frac{dz}{dt} = \frac{d}{dt}(14t^2 + t^2 + t) = 28t + 2t + 1 = 30t + 1$$

3. (2 points) Given that $F(y, x) = 2x^2 + 4xy - y^4 + 67 = 0$ implicitly defines a function $y = f(x)$, find $\frac{dy}{dx}$ when $y = 3$ and $x = 1$.

$$\text{Ans. } \frac{dy}{dx} = -\frac{F_x}{F_y} = -\frac{4x+4y}{4x-4y^3}$$

$$\text{At } (x=1, y=3), \frac{dy}{dx} = -\frac{16}{-104} = \frac{2}{13}$$