Topics on Microeconomics

Homework 1

- 作業請以 A4 紙張書寫，於 11 月 7 日 上課前繳交。

1.

Find the extreme values of the following functions, and check whether they are maxima or minima.

a. $f(x,y) = x^2 + xy + 2y^2 + 3$

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

2.

Consider the following constrained optimization problems and use the Lagrange-multiplier method to find the optimal values x^*, y^*, z^* :

a. $z = x(y+4)$ subject to $x + y = 8$.

b. $z = x - 3y - xy$ subject to $x + y = 6$.

Note: You will need to check the second order sufficient condition in each question.

3.

Consider a competitive firm with the following profit function:

$$\pi = Q - wL - rK,$$

where $Q = L^{1/2}K^{1/4}$, $L =$ labor, $K =$ capital, $w, r =$ input prices for L and K.

a. Find the first order condition for profit maximization.
b. Find the second order sufficient condition for profit maximization.
c. Find the factor demand functions for labor and capital.

4.

Consider a consumer's utility maximization problem, given the utility function $u = (x+2)(y+1)$ and the budget constraint $p_x x + p_y y = w$.

a. Write the Lagrange function.
b. Find x^*, y^*, λ^*.
c. Check the second-order sufficient condition for maximum.