Homework Day 8 - ECON 186

Problem 1. Chiang and Wainwright 11.4 #1, 3

Find the extreme values, if any, of the following four functions. Check whether they are maxima or minima by the determinantal test.

#1

$z = x_1^2 + 3x_2^2 - 3x_1x_2 + 4x_2x_3 + 6x_3^2$

#3

$z = x_1x_3 + x_1^2 - x_2 + x_2x_3 + x_2^2 + 3x_3^2$

Problem 2. Chiang and Wainwright 12.2 #1(d), 6

#1

Use the Lagrange-multiplier method to find the stationary values of z:

(d)$z = 7 - y + x^2$, subject to $x + y = 0$

#6

If the Lagrangian function is written as $Z = f(x, y) + \lambda[g(x, y) - c]$ rather than as in (12.7), can we still interpret the Lagrange multiplier as in(12.16)? Give the new interpretation, if any.

($Z = f(x, y)+\lambda\ [c - g(x, y)]$(12.7), $\frac{dZ^*}{dc} = \lambda\ ^*$(12.16))

Problem 3. Chiang and Wainwright 12.5 #1 (a,b)

#1

Given $U = (x + 2)(y + 1)$ and $P_x = 4$, $P_y = 6$, and $B = 130$:

(a)Write the Lagrangian function.

(b)Find the optimal levels of purchase x^* and y^*

Problem 4.

Suppose that a firm produces two inputs x and y to produce one output. The production function is $f(x, y) = xy^2$. The price of the output is 5, the price of input x is 10 and the price of input y is 6. Furthermore, the firm is constrained by law that it must use exactly the same amount of both inputs at all times.

(a) Write the Lagrangian function.

(b) Find the optimum levels of the input goods, x and y.

Problem 5.

Find the optimum levels of x, y, and z for the function $f(x, y, z) = xyz$ subject to $x + y + z = 45$ and $y = 2x$.