ECONOMICS 331
Mathematical Economics
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Homework Assignment 7

1. Suppose that the output q of a firm depends on the quantities of z_1 and z_2 that it employs as inputs. Its output level is determined by the production function

$$q = 26z_1 + 24z_2 - 7z_1^2 - 12z_1z_2 - 6z_2^2$$

   (a) Write down the firm's profit function when the price of q is \$1 and the factor prices are w_1 and w_2(per unit) respectively.

   (b) Find the levels of z_1^* and z_2^* which maximize the firm's profits. Note that these **are** the firm's **demand** curves for the two inputs.

   (c) Verify that your solution to **[2]** satisfies the second order conditions for a maximum.

   (d) What will be the effect of an increase in w_1 on the firm's use of each input and on its output q? [hint: You do not have to explicitly determine the firm's supply curve of output to determine $\partial q/\partial w_1$. Instead write out the total derivative of q and make use of the very simple expressions for $\partial q/\partial z_1$ and $\partial q/\partial z_2$ at the optimum that can be obtained from the first order conditions.]

   (e) Is the firm's production function strictly concave? Explain

2. Do question #2 from Exercise 11.6 (page 341)

3. Do question #1 from Exercise 11.7 (page 345)