

Homework 4

Due: **Wednesday, 27 November**

IMPORTANT NOTE: Please submit your assignment online through Canvas by the due date or deadline. You may write your answers in MS Word or use any other processor (e.g., LaTeX). However, the final file you upload on Canvas must be a pdf document. It is also fine to write your answers on paper and then scan them or take a high-quality image using your camera/phone and create a PDF document to upload on Canvas.

Other Notes: *Please note that the questions are based on the material covered in Lectures 7-9. There are five questions in this assignment. You must show all steps to get full credit for an answer.*

Question 1: (20 points) A consumer's preferences are represented by the utility function

$$u(x_1, x_2) = 2\ln x_1 + \ln x_2$$

If the budget constraint is $p_1x_1 + p_2x_2 = M$, determine the demand functions for x_1 and x_2 using the Lagrangean method.

Question 2: (20 points) A firm has production function

$$q(k, l) = 50k^{2/3}l^{1/3},$$

and unit capital and labor costs of 6 and 4, respectively. What is the maximum output achievable in a week if the firm spends no more than 1000 each week? Use the Lagrangean method to solve the problem.

Question 3: (20 points) Use the method of elementary row operations to solve the following system of equations

$$x_1 + 2x_2 + 2x_3 = 7$$

$$4x_1 + 5x_2 + x_3 = 11$$

$$7x_1 - 4x_2 - x_3 = 1$$

Question 4: (20 points) Use the method of elementary row operations to find the inverse of

$$A = \begin{pmatrix} 1 & 4 & 3 \\ 1 & 5 & 5 \\ 2 & 11 & 13 \end{pmatrix}$$

Question 5: (20 points) Calculate the determinant of the matrix

$$\begin{pmatrix} 5 & 7 & -2 \\ 10 & 15 & -2 \\ 5 & 8 & -1 \end{pmatrix}$$