

MIDTERM EXAM
ODD SEMESTER 2018/2019 ACADEMIC YEAR
MATHEMATICS FOR ECONOMICS AND BUSINESS
MONDAY, 22 October 2018

Rules:

- Closed Book & Notes.
- Calculator is allowed.
- Handphone/Tablet are not allowed.
- Exam time: 2,5 hours.
- Answer all the problems below.

PROBLEM 1 (25%)

Given the national income model below:

$$Y = C + I_0 + G_0$$

$$C = a + b(Y - T); \quad a > 0, 0 < b < 1$$

$$T = d + tY; \quad d > 0, 0 < t < 1$$

where Y = national income, C = household consumption, I_0 = private investment, G_0 = government expenditure, T = tax, t = tax rate, and a , b , and d are parameters in the model. According to the given information, answer the following questions.

- a) Find the national income equilibrium. (7 points)
- b) Show mathematically, what happen to the national income equilibrium if the government increase its expenditure? (5 points)
- c) Referring to your answer in point b, explain how government expenditure affect national income equilibrium! (4 points)
- d) Show mathematically, what happen to the national income equilibrium if government decide to increase the tax rate? (9 points) (5 points)
- e) Referring to your answer in point d, explain how tax rate affect the national income equilibrium. [Hint: $(a - bd) > 0$] (9 points) (4 points)

PROBLEM 2 (25%)

Suppose that the demand and supply functions representing two commodities in two different markets are explained through the model below.

- 1) $Q_{d1} = 11 - 2P_1 + 3P_2$ dan $Q_{s1} = -17 + 3P_1 + 4P_2$ for the first commodity.
- 2) $Q_{d2} = 6 + 3P_1 - 2P_2$ dan $Q_{s2} = -14 + 4P_1 + 3P_2$, for the second commodity.

Based on the market demand and supply equation above, answer the following questions.

- a) Find the equilibrium in each of the market; market for commodity 1 and market for commodity 2! **(6 points)**
- b) Convert the equation you obtain in point a, into matrix, and find the equilibrium price (using matrix). **(8 points)**
- c) Find the quantity in equilibrium for each of the two commodities. **(7 points)**
- d) Based on the market demand equation, define the relationship between commodity 1 and commodity 2. **(4 points)**

PROBLEM 3 (25%)

Consider the constant elasticity demand function given below:

$$Q_1 = 6p_1^{-2}p_2^{\frac{3}{2}}$$

where Q_1 is the demand for good 1 and p_i represent the price of good i , where $i=1, 2$. Suppose the current prices for good 1 is 6, and good 2 is 9. Based on the given information, answer the following questions!

- a. How much is the current demand for good 1? **(5 points)**
- a) Calculate the price elasticity of demand. **(7 points)**
- b) Calculate the cross price elasticity of demand. **(7 points)**
- c) Referring to your answer in point c, what happen to the demand of good 1, if the price of good 2 changes? **(6 points)**

PROBLEM 4 (25%)

Suppose the demand for housing is determine by its price (P), the loan interest rate (r), and income per capita (Y). Thus, the demand for housing model is define as below:

$$Q = 8 - 0,2P + 0,05Y - 4r \quad , \quad \text{where } P = 0,5 + 0,1r \text{ dan } Y = 10 - 0,025r$$

- a) Determine what happen to the total change in demand for housing, if there is a change in all independent variable? **(7 points)**
- b) Determine what happen to the rate of change of demand for housing, if there is a change in the loan interest rate (note: do not assume other variables to be constant) **(8 points)**
- c) Referring to point b, define the direct and indirect effect! **(5 points)**
- d) Referring to the housing demand model, what should the developer do to increase its sales for housing? **(5 points)**