

SECTION I: MICROECONOMICS

(#1) Multiple-Choice Questions:

(1.1) Production of a particular chemical causes detrimental externalities because chemical firms spew pollutant into rivers. The government taxes factories \$5 for every barrel of the chemical they produce. This taxation will result in the production of the socially efficient amount of the chemical if, at the level of output chosen by the industry under the new policy, (6 points)

- a. the incidental cost per barrel is \$5 and the government spends the tax revenue however it wishes.
- b. the incidental cost per barrel is \$5 and the government gives the tax revenue to the people harmed by the pollution.
- c. the marginal social cost per barrel is \$5 and the government spends the tax revenue however it wishes.
- d. the marginal cost per barrel is \$5 and the government gives the tax revenue to the people harmed by the people.

(1.2) At a firm's sale-maximizing level of output, its price elasticity of demand is _____ (6 points)

- a. zero
- b. elastic
- c. one
- d. inelastic

(1.3) A monopolist in the radio industry has two radio-making plants. the marginal cost of radio production by the plant A is $\$4Q$ (where Q is the number of radios produced) and the marginal cost of radio plant B is always \$16. If the demand curve for radios is downward sloping, (6 points)

- a. the monopolist will never produce radios at plant A.
- b. the monopolist will always produce four times as many radios at plant B as at Plant A.
- c. the monopolist will never produce more than four radios at Plant A.
- d. the monopolist will produce radios at Plant A only as a last resort.

(#2) Draw a series of L-shaped indifference curves. Interpret what such a curve conveys about a consumer's preferences and give an example of a good which corresponds to the L-shaped curve. (8 points)

(#3) Suppose a monopolistic firm has the long-run production function $Q=(LK)^{\frac{1}{2}}$ where Q =output, L =labor input, and K =capital input. Also let wage=price of capital=1. Answer the following questions:

(3.1) Find the cost minimizing quantities of labor and capital, L^* and K^* , as a function of Q . (10 points)

(3.2) Find the long-run total-cost function (TC), using your answers to (3.1). (6 points)

(3.3) Find the profit-maximizing output Q^* , when demand is given by $P=122-3Q$. (8 points)

SECTION II: MACROECONOMICS**(#1)**(1.1) Let C_t denote consumption at time t , Y_t denote disposable income at time t .

(a) Explain the meaning of the simple Keynesian consumption function

$$C_t = c * Y_t \quad (i)$$

where c is a constant. (2 points)(b) Does the observed ratio C_t / Y_t fluctuate over time? Why? (2 points)

(1.2) A simplified version of a modern consumption function is

$$C_t = a * W_t + b * \theta * Y_t + b * (1 - \theta) * Y_{t-1} \quad (ii)$$

where W_t is a real wealth at time t , and a , b , and θ are all parameters.

(a) Does this function illustrate the main features of the life-cycle hypothesis, the permanent-income hypothesis, or both? Why? (4 points)

(b) Graphically, use this consumption function to show the effects on consumption of a sustained increase in consumption. (4 points)

(1.3) The modern consumption function in equation (ii) includes wealth. Show in an IS-LM diagram how an increase in wealth affects the level of output and the interest rate. (4 points)

(#2)

(2.1) Suppose we assume a production function of the form

$$Y = A * K^a * L^b * Z^c \quad (iii)$$

where Y denotes output, A denotes the state of technology, K denotes capital input, L denotes labor input, Z is a measure of natural resources, and a , b , c , are parameters. Assume this production function obeys constant returns to scale and diminishing returns to each factor. Mathematically show what will happen to per capita output if capital and labor grow together but resources are fixed. (4 points)(2.2) Mathematically show what will happen to per capita output if Z is fixed but there is technical progress. (4 points)**(#3)**(3.1) Suppose that the total cost of holding money is the sum of the transaction cost ($n * tc$) and the interest cost $i * m$. Assume further that m is the average cash balance, i.e., $m = y / 2 * n$. Derive Baumol-Tobin's transaction demand for money. (4 points)

(3.2) Graph your answer to (3.1). Indicate the effect of an increase in the interest rate on the optimal number of transactions. (2 points)

(3.3) Calculate the income elasticity of the demand for money, and the elasticity of the demand for money with respect to the transaction cost. (2 points)

(3.4) Suppose that the interest rate decreases by 3%. What is the percentage change in the money demand? (2 points)

(#4) Let y_t be the actual level of output, y_t^* the full-employment level of output, π_t the inflation rate, and λ a positive parameter. Note that the subscript t (or $t-1$) denotes time period t (or $t-1$). Consider an economy that experiences an adverse supply shock. We model this by introducing into the Phillips curve (or the dynamic aggregate supply curve) a one-time shock x_t :

$$\pi_t = \pi_{t-1} + \lambda(y_t - y_t^*) + x_t \quad (\text{iv})$$

The term x_t is positive during the supply shock. In a two-dimensional diagram with y_t on the horizontal axis and π_t on the vertical axis, show the adjustment process to such a disturbance. (6 points)

(#5) Assume the following IS-LM model for the expenditure sector and the money sector.

Expenditure Sector

$$AD = C + I + G + NX$$

$$C = 100 + (4/5) \cdot Y_d$$

$$Y_d = Y - TA + TR$$

$$TA = (1/4) \cdot Y$$

$$TR = 250 - (1/5) \cdot Y$$

$$I = 300 - 20 \cdot i$$

$$G = 120$$

$$NX = -20$$

Money Sector

$$\bar{M} = 700$$

$$\bar{P} = 2$$

$$M_t = \bar{M} / \bar{P}$$

$$L = (1/3) \cdot Y + 200 - 10 \cdot i$$

Equilibrium conditions in the two sectors are given by

$$Y = AD$$

$$M_t = L$$

(5.1) Derive the equilibrium values of consumption (C), investment spending (I), and demand for real cash balances (L). (3 points)

(5.2) How much of investment will be crowded out if the government increases its purchases by $\Delta G = 160$, and the money supply is not changed? (2 points)

(5.3) Show your solutions to (5.1) and (5.2) graphically. (2 points)

(5.4) By how much will the equilibrium level of income and the interest rate change from (b), if money supply is increased to $M_t' = 1000$? What does the sign of the equilibrium interest rate imply? (3 points)