經濟理論　第(一)卷

2020/5/1

本試卷分為第(一)卷，卷(一)共 4 題，總分 100 分。
請將答案分別填寫於相對應試卷之答案本內。

1. (25 points) An industry consists of a large number of firms, each of which has a cost function of the form

$$C(w_1, w_2, y) = (y^2 + 1)w_1 + (y^2 + 2)w_2$$

(a) Find the average cost curve of a firm and describe how it shifts as the factor price w_1/w_2 changes.

(b) Find the short-run supply curve of an individual firm.

(c) Find the long-run industry supply curve.

(d) Describe an input requirement set for an individual firm.

2. (25 points) Consider a simple economy which acts as though there is one consumer with utility function $u_1(x_1) + u_2(x_2) + y$, where x_1 and x_2 are the amounts of good 1 and 2, respectively, and y is money to spend on all other goods. Suppose that good 1 is supplied by a firm that acts competitively and good 2 is supplied by a firm that acts like a monopoly. The cost function for good i is denoted by $c_i(x_i)$, and there is a specific tax of amount t_i on the output of industry i. Assume that $c_i'' > 0, \ p_i'' < 0, \ \text{and} \ p_i' < 0$.

(a) Derive expressions for dx_i/dt_i for i=1,2 and sign them.

(b) Given a change in outputs (dx_1, dx_2), derive an expression for the change in welfare.

(c) Suppose that we consider taxing one of the two industries and using the proceeds to subsidize the other. Should we tax the competitive industry or the monopoly?

3. (25 points) A coin has probability p of landing heads. You are offered a bet in which you will be paid $\$2^j$ if the first head occurs on the jth flip.

   (a) What is the expected value of this bet when $p = 1/2$?

   (b) Suppose that your expected utility function is $u(x) = \ln x$. Express the utility of this game to you as a sum.

   (c) Evaluate the sum.

   (d) Let w_0 be the amount of money that would give you the same utility you would have if you played this game. Solve for w_0.

4. (25 points) Consider an economy with two firms and two consumers. Firm 1 is entirely owned by consumer 1. It produces guns from oil via the production function $g = 2x$. Firm 2 is entirely owned by consumer 2; it produces butter from oil via the production function $b = 3x$. Each consumer owns 10 units of oil. Consumer 1's utility function is $u(g,b) = g^{0.4}b^{0.6}$ and consumer 2's utility function is $u(g,b) = 10 + 0.5\ln g + 0.5\ln b$.

   (a) Find the market clearing prices for guns, butter, and oil.

   (b) How many guns and how much butter does each consumer consume?

   (c) How much oil does oil does each firm use?