

Name: \_\_\_\_\_  
SID: \_\_\_\_\_

EEP100 Midterm (Oct 15, 2009)

This midterm is worth 15 percent of your entire grade. The questions are worth 15 points in total. For full credit, show your work. Clear, concise answers are better than disorganized, vague essays. Enjoy!

TRUE/FALSE AND EXPLAIN [5 PTS]

Each question is worth  $\frac{1}{2}$  **point**, most of which depends on a good explanation.

- (1) As long as when people have different values for goods and property rights are protected, markets always “happen.”

**FALSE:** They will not happen if transaction costs are large enough to make trades unattractive.

- (2) I motivated you all to write blog posts by giving you points, but you may have worked for more than points.

**TRUE:** Points (like money) are a form of extrinsic motivation. Intrinsic motivation is also important: Students who care about their image as thinkers (or economists!) will work hard to produce a product that they are proud to call their own.

- (3) The deadweight loss from a tax is always measured by the triangular area bordered by the supply and demand curves on the right and a line representing the magnitude of the tax (e.g., 10 percent high) on the left.

**FALSE:** The deadweight loss of a tax is this triangle PLUS losses from negotiating and collecting the tax. If the tax revenue is wasted on inefficient (e.g., politically-popular) programs, then DWL will be greater still.

- (4) Under the Class Pass system (compared to students buying tickets/passes when it suits them), AC Transit has a greater incentive to meet students’ transportation “needs.”

**FALSE:** AC Transit receives Class Pass revenue without regard to student needs – blunting the incentive to change routes in changing conditions. Further, AC Transit does not receive price signals on (un)profitable routes because Class Pass riders do not pay for each ride.

- (5) A firm should grow as long as the marginal benefit to the managers exceeds the marginal cost they experience.

**FALSE:** A firm should grow as long as the marginal benefit to *the firm* exceeds the marginal cost. Although the distribution of costs and benefits may be uneven within the firm, Coase’s Theory of the Firm treats the firm as a monolith. An uneven distribution of costs and benefits among individuals (e.g., managers vs. employees) may explain why some firms grow to an “inefficient” size.

- (6) Hayek explains how a central planner can aggregate information (on preferences, externalities, etc.) to make decisions that maximize social welfare.

**FALSE:** Hayek explains how such an aggregation is logistically impossible. He explains how prices aggregate information to send useful signals. He does not address

externalities, but prices on externalities can be used to “internalize” them and make price signals more accurate.

- (7) Hazlitt’s “One Lesson” is that we will pursue an activity as long as the marginal benefit exceeds the marginal cost.

**FALSE:** Page 5 [*emphasis added*]: “The art of economics consists in looking not merely at the immediate but at the *longer effects* of any act or policy; it consists in tracing the consequences of that policy not merely for one group but for *all groups*.”

- (8) For a typical business (e.g., a coffee shop), economies of scale are limited by its access to labor.

**FALSE:** Labor is not a typical restraint. Capital (coffee machines) or managerial talent are much more common constraints.

- (9) Markets are more efficient than bureaucracies at allocating goods and services because they use prices.

**FALSE:** Sometimes prices are inaccurate (e.g., with externalities); sometimes the transactions costs of discovering/using prices are so large that allocation is inefficient. The best answer is that markets are sometimes better and sometimes not.

- (10) Most markets are efficient because they achieve equilibrium.

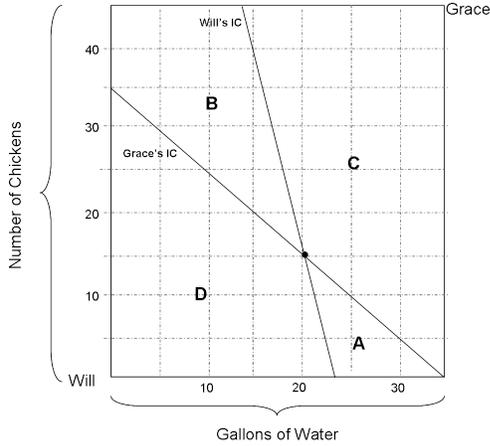
**FALSE:** Markets are efficient because they match willing buyers and willing sellers at low cost. They are rarely at equilibrium (price and quantity stable), but even out-of-equilibrium markets increase surplus by allowing “gains from trade” (one man’s trash is another man’s treasure).

### LONGER QUESTIONS [10 PTS]

Each question is worth 2 points. Show your work! (It’s better to do work on the back of the page and put answers on the front.)

- (1) Suppose Will and Grace are stranded on a deserted island. Will has 20 gallons of drinking water and 15 chickens. Grace has 15 gallons of water and 30 chickens. At the initial allocation, Will’s  $MRS_{water,chickens} = 5$  (i.e. Will would be just as well off if he gave away 5 chickens in return for 1 gallon of water). Grace’s  $MRS_{water,chickens} = 1$ .
- (a) Suppose chickens and water are perfect substitutes. Graph the Edgeworth box for this economy with Will’s origin on the bottom left and chickens on the vertical axis. Label the origins, axes, and initial endowments. Using the given MRSs, draw and label Will and Grace’s indifference curves at the point of the initial endowments and label the following regions:
- A=both Will and Grace are better off.
  - B=both Will and Grace are worse off.
  - C=Will is better off, Grace is worse off.
  - D=Will is worse off, Grace is better off.

**Answer:** From the MRS, we know that the slope of Will’s IC is -5, and the slope of Grace’s IC is -1. Will is better off anywhere to the right of his IC, Grace is better off anywhere below to the left of her IC.



- (2) Consider an economy with a consumer and goods  $x$  and  $y$ . Suppose that the consumer's demand function for each good is:

$$\begin{cases} x = \frac{mp_y}{p_x} \\ y = \frac{m(1-p_y)}{p_y} \end{cases}$$

where:  $x$  denotes the consumer's demand for good  $x$ ,  $y$  denotes the consumer's demand for good  $y$ ;  $p_x$  is the price of good  $x$ ,  $p_y$  is the price of good  $y$ ;  $m$  denotes the consumer's income. Assume that the income and prices are all positive.

- (a) Calculate the cross price elasticity of demand for good  $x$  with respect to the price of good  $y$ , and then state whether good  $x$  is a substitute, or complement, or neither to good  $y$ .
- (b) Calculate the income elasticity of demand for good  $y$  and state whether good  $y$  is a(n) normal or inferior good.

### Answers

- (a) By the definition of cross price elasticity of demand, we have:

$$\varepsilon_{xy} = \frac{\partial x}{\partial p_y} \cdot \frac{p_y}{x} = \frac{m}{p_x} \cdot \frac{p_y}{x} = \frac{m}{p_x} \cdot \frac{p_y}{\frac{mp_y}{p_x}} = 1 > 0$$

This implies that when the price of good  $y$  increases, the demand for good  $x$  will also increase, suggesting that good  $x$  is a substitute to good  $y$ .

- (b) By the definition of income elasticity of demand, we have:

$$\varepsilon_{ym} = \frac{\partial y}{\partial m} \cdot \frac{m}{y} = \frac{(1-p_y)}{p_y} \cdot \frac{m}{\frac{m(1-p_y)}{p_y}} = 1 > 0$$

This implies that when the consumer's income increases, his/her demand for good  $y$  will also increase, meaning that good  $y$  is a normal good.

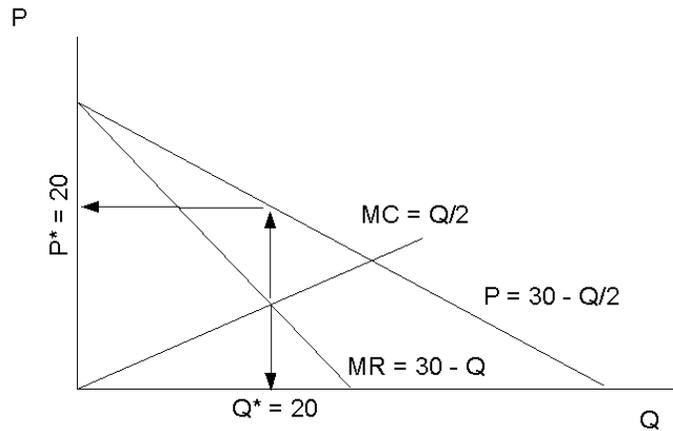
- (3) Assume that a monopolist faces a demand function of  $Q = 60 - 2P$ , has a production technology of  $Q(L) = 2L^{\frac{1}{2}}$ , and pays a wage of 1. Find:
- (a) The firm's profit function, profit-maximizing quantity ( $Q^*$ ) and profits.

$$\pi(Q) = TR - TC \Rightarrow \pi(Q) = \left(30 - \frac{Q}{2}\right)Q - \frac{Q^2}{4} \Rightarrow 30Q - \frac{3Q^2}{4}$$

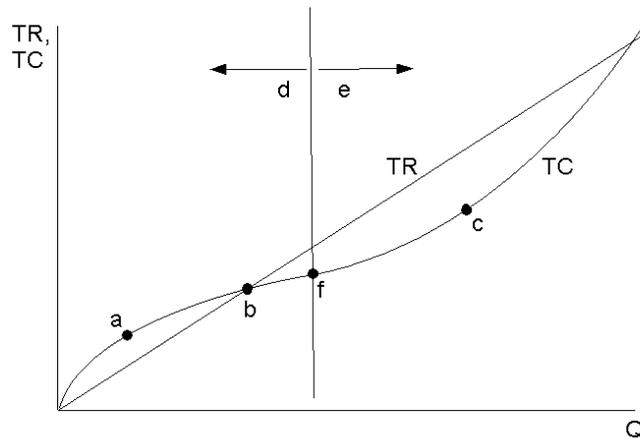
$$\frac{d\pi}{dQ} = 30 - \frac{3}{2}Q \stackrel{set}{=} 0 \Rightarrow Q^* = 20, P^* = 20 \Rightarrow \pi^* = 300.$$

- (b) Draw curves for demand, supply and marginal revenue. Label equilibrium price and quantity.

**Answer:**



- (4) The figure below shows a firm's total revenue and total cost curves. Tell us what is happening at points a–c (with respect to market power and/or profits) and (with respect to economies of scale and/or scope) in areas on the left (d), on the right (e), and on the line (at f).



### Answers

- (a) This is the profit MINIMIZING point, where total cost less total revenue is greatest. This firm has no market power (TR is linear; it would fall with Q if the firm had market power)
- (b) This is the BREAKEVEN point, where total cost equals total revenue.
- (c) This is the profit MAXIMIZING point, where total revenue less total cost is greatest

- (d) On this side of the line, the firm is experiencing INCREASING returns to scale – total costs are rising at a decreasing rate.
- (e) On this side of the line, the firm is experiencing DECREASING returns to scale – total costs are rising at an increasing rate.
- (f) On the line (the inflection point), the firm has CONSTANT returns to scale – total costs are rising at the same rate).
- (5) Consider an economy with two consumers 1 and 2, and two goods  $x$  and  $y$ . Assume that consumer 1's preference can be represented by a utility function:

$$U_1(x_1, y_1) = x_1^{\frac{1}{2}} y_1^{\frac{1}{2}},$$

and that consumer 2's preference can be represented by another utility function:

$$U_2(x_2, y_2) = \min(x_2, y_2)$$

where:  $x_1$  denotes consumer 1's demand for good  $x$ ,  $y_1$  denotes consumer 1's demand for good  $y$ ;  $x_2$  denotes consumer 2's demand for good  $x$ ,  $y_2$  denotes consumer 2's demand for good  $y$ .

Suppose that the price of  $x$  is \$1, the price of  $y$  is \$2, and that both consumers have an income of \$12. Find the **market demand** for each good and each consumer's utility from their consumption.

**Answers**

- (a) Consumer 1's utility-maximization problem is:

$$\text{Max}_{x_1, y_1 \geq 0} U_1(x_1, y_1) = x_1^{\frac{1}{2}} y_1^{\frac{1}{2}}$$

$$s.t. \ x_1 + 2y_1 \leq 12$$

Since the utility function is a Cobb-Douglas utility function, then we can take the natural log to the utility function before applying the Lagrangian.

$$\ln\left(x_1^{\frac{1}{2}} y_1^{\frac{1}{2}}\right) = \frac{1}{2} \ln(x_1) + \frac{1}{2} \ln(y_1)$$

Therefore the lagrangian can be written as:

$$\mathcal{L}(x_1, x_2, \lambda) = \frac{1}{2} \ln(x_1) + \frac{1}{2} \ln(y_1) - \lambda(x_1 + 2y_1 - 12)$$

$$\Rightarrow \text{F.O.C.s} : \begin{cases} \frac{\partial \mathcal{L}}{\partial x_1} = \frac{1}{2x_1} - \lambda = 0 \\ \frac{\partial \mathcal{L}}{\partial y_1} = \frac{1}{2y_1} - 2\lambda = 0 \\ \frac{\partial \mathcal{L}}{\partial \lambda} = -(x_1 + 2y_1 - 12) = 0 \end{cases} \Rightarrow \begin{cases} 2 \cdot \frac{1}{2x_1} = 2\lambda = \frac{1}{2y_1} \\ x_1 + 2y_1 - 12 = 0 \end{cases} \Rightarrow \begin{cases} x_1^* = 6 \\ y_1^* = 3 \end{cases}$$

For consumer 2, since good  $x$  and good  $y$  are perfect complements, then we can have the following two conditions:

$$\begin{cases} x_2 = y_2 \\ x_2 + 2y_2 - 12 = 0 \end{cases} \Rightarrow \begin{cases} x_2^* = 4 \\ y_2^* = 4 \end{cases}$$

Note: you can also find  $(x_2^*, y_2^*)$  using the budget line and indifference curves. Therefore, if  $X$  denotes the market demand for good  $x$ , and  $Y$  denotes the market demand for good  $y$ , then the market demand for each good can be calculated as:

$$\begin{cases} X = x_1^* + x_2^* = 6 + 4 = 10 \\ Y = y_1^* + y_2^* = 3 + 4 = 7 \end{cases}$$

(b) Consumer 1's utility from consumption is:

$$U_1(x_1^*, y_1^*) = (x_1^*)^{\frac{1}{2}}(y_1^*)^{\frac{1}{2}} = 6^{\frac{1}{2}} \cdot 3^{\frac{1}{2}} = \sqrt{6 \cdot 3} = 3\sqrt{2}$$

and consumer 2's utility from consumption is:

$$U_2(x_2^*, y_2^*) = \min(x_2^*, y_2^*) = \min(4, 4) = 4$$