

**Econ 001: Midterm 2 (Dr. Stein) Answer Key**  
**March 21, 2013**

**Instructions:**

- **This is a 60-minute examination.**
- **Write all answers in the blue books provided. Show all work. Use diagrams where appropriate and label all diagrams carefully.**
- **Write your name and your Recitation Instructor's name in every blue book that you use.**
- **This exam is given under the rules of Penn's Honor system.**
- **All blue books, blank or filled, must be handed in at the end of this exam. No blue books may be taken from the room.**
- **No calculators are allowed!**

You need 2 blue books. You are required to use the two blue books as follows:

1. **BOOK 1:** write your answers to the **8 multiple-choice questions** on the first page and then write your answers to the **first short-answer question** in the remainder of the book.
2. **BOOK 2:** write your answers to the **second short-answer question**.

**Part I: Multiple Choice Questions (Best 7 out of 8: 5 points each/35 points total):**

**Please answer all MC questions. Only the best 7 will count towards your grade.**

1. Evan consumes two goods: Instant Soup and coffee. The price of Instant Soup goes down, while the price of coffee and income remain the same. What is the effect on the budget line?

- a. It will rotate out on the Instant Soup axis.
- b. It will rotate out on the coffee axis.
- c. It will shift out on both axes.
- d. It will shift in on both axes.

2. Evan consumes two goods: Instant Soup and coffee. Instant Soup is an inferior good. If the price of Instant Soup goes down, while the price of coffee and income remain the same, which of the following statements **must** be true?

- I. Evan will buy more Instant Soup.
- II. Evan will buy more Coffee.
- III. Evan will buy the same amount of Coffee.

- a. I only
- b. II only
- c. III only
- d. I and II only
- e. II and III only
- f. I and III only
- g. I, II and III
- h. None of these statements must be true

3. In preparation for Hurricane Sandy, Ms. O'Malley has set up groups of high school kids to fill sand bags. She has found that by increasing the number of students per groups from 2 to 3 to 4 to 5, the number of sand bags filled per hour increases from 12 to 15 to 20 to 22. She deduces that:

- I. the marginal productivity is diminishing past the 4<sup>th</sup> student.
- II. the fifth student in each group should be sent home.

- a. Only I
- b. Only II
- c. Both I and II
- d. None of the above

4. If Average Total Cost is decreasing which of the following **must** be true:

- I. Marginal Cost is increasing
- II. Average Variable Cost is decreasing.
- III. The Average Total Cost and Marginal Cost curve have not yet intersected.

- a. I only
- b. II only
- c. III only
- d. I and II only
- e. II and III only
- f. I and III only
- g. I, II and III

5. Audrey claims that Fresh Grocer is a monopolist, controlling the market for groceries on Penn's campus. Jonathan says that the market for groceries is instead monopolistically competitive. Which of the following supports Audrey's claim?

- a. She knows that Fresh Grocer's marginal revenue is downward sloping.
- b. Audrey knows that the market for groceries is inefficient.
- c. Jonathan often buys milk at Wawa instead of at Fresh Grocer.
- d. Fresh Grocer enjoys a profit in the long run.

6. Jose sells corn in a competitive industry. Recently, he hired a financial analyst to analyze his firm's performance. The analyst recommends that Jose continues to operate, but warns him that he will be operating at a loss. The analyst must have concluded that the firm's

- a. Total Revenues exceed Total Costs.
- b. Total Revenues exceed Total Variable Costs.
- c. Marginal Cost equals Average Total Cost.
- d. Average Variable Cost is greater than Marginal Revenue.

7. Which of the following statements are true?

- I. If a monopolist wants to maximize profit/minimize loss, he will choose to produce where  $P=MC$ .
- II. If a monopolist wants to maximize revenue, he will choose to produce where demand is unit elastic.
- III. If there is no fixed cost, then maximizing profit is equivalent to maximizing revenue.

- a. I
- b. II
- c. III
- d. I and II
- e. I and III
- f. II and III
- g. I, II and III
- h. None is true

8. Suppose Exxon can distinguish between two types of drivers and that the marginal cost of selling gasoline is constant:

Drivers who live in the suburbs, who must drive everyday and thus have a very inelastic demand for gas.

Drivers who live in the city, who may choose to take the bus or walk to work and thus have a very elastic demand for gas.

Which of the following is true?

- a. Exxon receives a higher marginal revenue from suburban drivers than city drivers.
- b. Because of this price discrimination, the market for gas is efficient.
- c. Exxon will certainly sell a higher quantity of gas in the suburbs than in the city.
- d. Exxon will charge more per gallon of gas to suburban drivers than city drivers.

**Answers:**

1. a
2. h
3. a
4. c
5. d
6. b
7. b
8. d

**Q1. (35 points) Please use bluebook #1 for this question.**

**You must use graphs to answer every part of the following question. Do not write more than sentence for each part. Instead, show your answer on the graph.**

Guar gum, a natural thickener used in ice cream, is grown by farmers in a perfectly competitive industry. For many years the market was in a long run equilibrium but recently the use of the product in hydraulic fracturing has shaken the industry up. This question asks you to analyze this case from the perspective of Pukhraj Parihar, one of many farmers in India's northwestern Rajasthan state.

- a. Start by drawing two graphs, side by side, one of the industry and the other of the costs and the demand faced by Parihar, both in a long run equilibrium. Mark the equilibrium price  $P^{LR}$ , the quantity Parihar grows,  $q_0$  and the quantity produced in the industry as a whole,  $Q_0$ .
- b. How will the new use of guar gum in hydraulic fracturing affect the demand in the industry as a whole and the demand Parihar faces? In the short run, will he change the amount of guar gum he produces? Will he be making profits? Show any profits graphically.
- c. In our standard model, how would we expect the market to move to a long run equilibrium? What will happen to the long run price, the amount Parihar produces and the quantity produced in the industry as a whole?
- d. Parihar complains that the strong market for guar gum has resulted in higher demand for land and thus the rent he must pay per acre has tripled. If that is correct will the long run price be as you suggested in part c? If the long run price is not the one you suggested in part c, show the correct long run price and equilibrium quantities.
- e. Sangeeta owns her own plot of land on which she grows guar gum. She says: “the increased demand for my product is wonderful, the price is up and, given that I do not

need to pay rent, I am making higher profits than ever, even in the long run". Is she correct? Explain.

**Answers:**

**a. Answers:**

**Typical LR graph. See below.**

**Points: 7**

**Understanding what graphs are requested:4**

**Of these: 2 for industry ( show only s and d, no cost curves, no mr)**

**2 for firm: arc and mc**

**Constant price:1**

**P=min atc: 1**

**Correct shape of mc and atc:1**

**b. Answers:**

**Demand shifts out, price increases, Q increases. as P increases the demand=MP=P facing the firm is higher, q increases. Profits.**

**See below.**

**Points: 8**

**Market demand shifts out: 2**

**P & Q bigger: 1**

**Demand facing the firm (or MR) higher:2**

**q larger=1**

**Profits:2**

**c. Answers:**

**Firms will enter the market driving price down to minATC. Each firms produces  $q_1=q_0$   
 $Q_1>Q_0$**

**Points: 8**

**Entry:2**

**$P^{LR}=\min ATC$ :2**

**$q_1=q_0$ : 2**

**$Q_1>Q_0$  : 2**

**d. Answers:**

**The higher price of land rental pushes the costs up so now we have a higher long run price then originally. If we assume that land is a fixed input we know for sure that each firm will be producing more in the long run then they did originally. We cannot predict what happens to the number of firms in the end as two opposing affects are working here: the increased demand and the increased costs.**

**Points: 7**

**Understanding cost increases: 2**

**$P_{r1}(2) = \min_{atc}(2) > \min_{atc}(1)$  :2**

**So price higher:1**

**Correct q: 1**

**Consistent Q:1**

**e. Answers:**

**Sangeeta is NOT correct the higher price of land rental has increased her opportunity cost of using the land so that her costs have increased just like they do for Parihar above.**

**In the long run her economic profits will be zero after taking this higher opportunity cost into account.**

**Points: 5 (too much?)**

**Profits in long run=zero: 2 points**

**Mentioning opportunity cost:3**

**Q2. (30 points)**

**We are looking for clear numeric solutions to each question. Show your reasoning and work to receive at least partial credit in the case of numerical errors.**

A military coup deposes the leader of North Korea, and the new reform-minded government invites a team of development economists, led by you to consult on how to reform the economy.

First on the agenda is re-structuring the economy to build infrastructure to most effectively deliver cable television to Pyongyang. Your economists estimate that the marginal cost of delivering cable television is 0\$, and that it has a fixed cost of 1,000\$ to lay the infrastructure. Furthermore, they estimate that demand is given by  $P = 1000 - Q$  and if one firm produces the good the marginal revenue is given by  $P = 1000 - 2Q$ .

- a. The new leader of the military junta enthuses over the wonders of the competitive markets he has heard so much about. Find the price and quantity that would be sold in a hypothetical competitive market for cable, and use that to explain to the new government why you don't think there will be a competitive market anytime soon.
  
- b. Instead, you recommend giving LG Telecom, a South Korean company, exclusive rights to supply cable services to Pyongyang. Find the price and quantity of service that LG

Telecom will provide. What is the marginal cost and the marginal benefit at this price and quantity?

- c. How much profit is LG Telecom making? Why is this not an efficient outcome? What is the efficient outcome?
- d. The leader of the junta furiously protests. He heard that competitive markets led to efficient outcomes, but here you are proposing an inefficient policy. He's about to drop you into the shark tank when Alberto, an economist on your team, intervenes and proposes an amendment: LG Telecom will be paid some money per subscriber. How much money does Alberto propose that LG Telecom be paid per customer in order to reach the efficient outcome and how did he arrive at that number?
- e. "Mamma mia!" wails Alberto as he is thrown into a shark tank. The general politely explains that he is already uncomfortable with the fact that LG Telecom is making a profit, and he certainly does not want to pay them more money. Propose an amendment to Alberto's suggestion that will result in zero profits and the efficient outcome while still allowing LG Telecom to choose their price. Justify your reasoning.

**a. Answers:**

**Setting  $P^* = MC = 0$  we get  $Q_d = 1,000$ . But given that the firms are losing money they will choose not to produce and the market will collapse entirely. Hence, competitive market is not a likely outcome in this case.**

**Points: 6**

**$P=MC$ : 2**

**$P=zero$ : 2**

**Therefore no production: 2**

**b. Answers:**

**Setting  $MC=MR$  we get  $0=1000 - 2Q$  or  $Q^M = 500$ ;  $P^M = 1000 - Q^M = 500$ ;**

**$MC = 0$ ;  $MB = 500$**

**Points: 6**

**$MC=MR$ : 1**

**$Q^M = 500$ : 1**

**Plug  $Q$  into  $D$  to get  $P$ : 1**

**$P^M = 500$ : 1**

**$MC = 0$ : 1**

**$MB = 500$ : 1**

**c. Answers:**

**Note as  $MC=AVC=zero$  profits= $TR-FC$**

**Profits=TR -FC=P\*Q-FC=500\*500-1000=\$249,000**

**This is not an efficient outcome as MB>MC (see part b)**

**The efficient outcome is where MB=MC or  $100-Q=0$   $Q^{eff}=1000$**

**Points: 6**

**Set up profits:2**

**Answer:1**

**Not efficient:1**

**$Q^{eff}=1000$ : 2 (1 for set up, 1 for answer)**

**Correct graphical approach 4/6**

**d. Answers:**

**The payment, s, must be such that  $MR=MC'=MC-s$  at  $Q=1000$ , where s is the per unit subsidy.**

**Setting up  $1000-2*1000=0-s$  we solve for  $s=1000$  per unit.**

**Points: 6**

**Set up: 3**

**$s=1000$ : 3**

**Note:**

**5 out of 6 if correct graphical approach**

**Partial credit for other answers: 2 out of 6 for average cost pricing**

**e. Answers:**

**The above solution has already generates the efficient outcome. If the only concern is the fact that the company is making profits, we can eliminate the profits by setting a tax equal to them. Note that the tax must be a one time or lump sum tax and NOT a per unit tax. A pre until tax would affect the MC curve, and we don't want to do that.**

**The firms profits in part d are  $TR-TC+sub=0-1000+1000*1000=\$999,000$  so this should be the size of the tax.**

**Points: 6**

**Understanding that we need a lump sum tax: 2**

**Set up : 2**

**Answer: 2**

**Partial credit for other answers:**

**Graphical answer 5/6**

**Perfect price discrimination with lump sum tax: 5 out of 6**

**Perfect price discrimination with no lump sum tax: 3/6**

**Average cost pricing: 2 out of 6**

**Average cost pricing plus lump sum tax: 1 out of 6**

**Marginal cost pricing plus lump sum subsidy: 3 out of 6**