

Econ 001: Midterm 2 (Dr. Stein) Answer Key
November 9, 2011

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!**

The Midterm has 2 parts. Part 1 consists of 8 multiple-choice questions. Part 2 consists of 2 short-answer questions.

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. Daniel and Kerren both spend all their allowance on Candy Corn and Snickers bars and they both buy some of each. Daniel had a budget of \$10 and Kerren \$5.

Which of the following statements must be true?

- I. At their consumption points, both Daniel and Kerren have the same Marginal Rate of Substitution of one good vs. the other.
 - II. Daniel purchases twice as much Candy Corn as Kerren does.
- a. I
 - b. II
 - c. I and II.
 - d. Neither statement is correct.

2. Using the information from the previous question, suppose that the price of Candy Corn increases. We are told that for Kerren the substitution effect and income effect on the purchase of Candy Corn are in the same direction. This implies that:

- I. Candy Corn for Kerren is a normal good.
 - II. She will now purchase less Candy Corn.
- a. Only I.
 - b. Only II.
 - c. Both I and II.
 - d. Neither I nor II.

3. We are told that in the production of wooden spoons the marginal cost of production is always increasing. This is consistent with labor having:

- I. gains from specialization
 - II. diminishing marginal productivity
- a. Only I.
 - b. Only II.
 - c. Both I and II.
 - d. Neither I nor II.

4. Suppose a firm's cost structure has the following features: ATC and AVC are U-Shaped and when the firm is producing 10 units of output, MC is equal to 10 and ATC is equal to 5. Given this information, which of the following could be true.

- a. ATC is falling; MC and ATC intersect at $Q=5$.
- b. ATC is falling; MC and ATC intersect at $Q=15$.
- c. ATC is rising; MC and ATC intersect at $Q=5$.
- d. ATC is rising; MC and ATC intersect at $Q=15$.

5. John sells cotton in a competitive industry. Recently, he hired a financial analyst to analyze his firm's performance. The analyst discovered that John's producer surplus is zero. The analyst must have concluded that the firm's

- a. Total revenue equals total costs.
- b. Total revenue is less than total costs.
- c. Total revenue is greater than total variable costs.
- d. None of the above.

6. A carpet seller in the Great Bazaar in Istanbul boasts: "I can tell how much each customer is willing to pay for my carpets and I make them pay that price." An economist overhearing him would conclude that:

- I. Consumer surplus in this case is zero.
 - II. The Bazaar is an efficient market.
- a. I
 - b. II
 - c. I and II.
 - d. Neither statement is correct.

7. A similarity between monopoly and monopolistic competition is that, in both market structures,

- a. Strategic interactions among sellers are important.
- b. There are many sellers.
- c. Sellers are price makers rather than price takers.
- d. Product differentiation is important.

8. A similarity between perfect competition and monopolistic competition is that, in both market structures,

- a. Strategic interactions among sellers are important.
- b. There are many sellers.
- c. Sellers are price makers rather than price takers.
- d. Product differentiation is important.

Answers:

1. a

2. c

3. b

4. c

5. b

6. c (given that 13 out of my 14 TAs chose this answer, I will stick with it. Note that you can get 100 on the exam even if you disagree as only the best 7 out of 8 MC count)

7. c

8. b

Part II: Short Answer Questions:

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

Note that even if you get lost in the calculations on this question, correct graphical answers will earn partial credit for parts d through f.

In this question we will consider the effect of government spending (also known as "fiscal stimulus") on the economy in the most recent recession. Suppose that the market for construction materials is perfectly competitive and that each firm has the following cost curves.

$$\begin{aligned}TC &= q^2 + q + 6 \\MC &= 2q + 1\end{aligned}$$

Suppose that in 2009, the worst period of the recession, private sector demand for construction materials was given by the equation:

$$P_d = -Q_d + 25 \quad \text{or} \quad Q_d = -P_d + 25$$

One particular firm in the market for construction supplies is Koncrete Co.

- In 2009, the price for the typical bundle of construction materials sold by Concrete Co. was \$5. Calculate the quantity produced by Koncrete Co. and the firm's profits or losses.
- Would the firm be better off if it shuts down in the **short run**? Explain why or why not. Does your answer change if we consider the **long run** instead? If so, how?
- Prove that if all firms are identical there are 10 firms operating in the market for construction supplies in 2009.

Now suppose the government intervenes in the market with the American Recovery and Reinvestment Act of 2009 (we will call it ARRA 2009), in which the government undertakes a variety of construction projects such as building bridges, roads, and train tracks. In this question we will interpret ARRA 2009 as a commitment by the government to buy a fixed number of units of construction materials at any market price. Let's assume that the government buys 12 units of construction materials.

- What is the equation for total market demand now?

The short run market supply curve is given by the equation:

$$P_s = (1/5)Q_s + 1 \quad \text{or} \quad Q_s = 5P_s - 5$$

- What is the new market equilibrium price and quantity? How much money does the government spend on construction materials? Is Koncrete Co. making money or losing money?
- Assuming that ARRA 2009 is a temporary program, how does ARRA 2009 affect the long run equilibrium price? Explain. (You do not need to answer this question numerically).

Answer Key:

a. For the perfectly competitive firm, $P = MC$ so we solve $5 = 2q + 1$ and $q^* = 2$.

$$TR = 5(2) = 10$$

$$TC = 2^2 + 2 + 6 = 12$$

$$\text{Profits} = -2$$

Points: 6

Set up $P=MC$: 1

$$q^* = 2: 2$$

Equation/set up for profits: 1

$$\text{Profits} = -2: 2$$

b. From the total cost equation we can see that the firm's fixed costs are 6, so the firm is better off operating in the short run since $-2 > -6$. In the long run, all costs are variable and firm would be better off exiting the industry. Another good answer: as profits are $< \text{zero}$ the firm would exit the industry.

Points: 6

Stating the criteria for production in the short run: 2

Checking that $P > AVC$ or that profits at $q(\text{zero}) < -2$: 2 points

Long run: 2

c. Plugging $P = \$5$ into the demand equation we find that $Q_d = -5 + 25 = 20$.

Since $Q^* = n(q^*)$ it must be that $n = 10$.

Points: 3

$$Q_d = -5 + 25 = 20.$$

Understanding $n=Q/q$: 2

$$d. \quad Q_d = -P_d + 25 + 12 = -P_d + 37$$

Points: 5

e. Answers:

Solving $Q_s = Q_d$ so $5P - 5 = -P + 37$ gives

$$P' = 7 \text{ and}$$

$$Q' = 30$$

$$\text{Government spends } 12 * P' = 12 * 7 = 84$$

At $P = 7$, Koncrete Co. makes $q' = 3$ units so

$$TR = 7(3) = 21$$

$$TC = 3^2 + 3 + 6 = 18$$

$$\text{Profits} = 3$$

Points:11

Qs=Qd: 1

P & Q: 2 each

Gove expenditure: 4 (2 for set up)

q':2

Profits>zero: 2 (1 for method, 1 for answer)

Partial credit: students who answered this part graphically get a max of 7/12

students who answered correctly given an error in part d: max of 8

f. ARRA will not affect the long run price as the minATC has not changed: 3 points

Points are given for stating that min ATC did not change.

Points: stating that P in the LR will return to what it was before:2

Stating that this is because minATC did not change:2

Q2. (30 points)

Please show your work using your graphs! Grading depends on the ability of the TA to evaluate whether or not you understand the graphical interpretation of these models.

Suppose that HPV vaccines are produced by a single patent holding firm. There are fixed cost associated with its production, but the marginal cost is small and constant.

- a. What market structure would you use to describe this situation? No need to explain.
- b. Draw a graph that describes this market structure. Mark clearly the quantity of vaccines produced and their price.

In order to encourage vaccinations the government wishes to make them more affordable. It thus places a price ceiling that is below the price you found in part b.

- c. Max, a student in econ001, says: “We know from Midterm 1, that such a policy would not increase the number of people who are vaccinated. A price ceiling will cause excess demand. The quantity produced will thus decrease as quantity supplied falls. Moreover, the price ceiling will cause Dead Weight Loss.” Evaluate each of these claims using your graph.

Re draw your graph from part a before answering part d.

- d. In order to encourage vaccinations the government wishes to make them more affordable. It thus decides to give a per unit subsidy to the firm. Bailey, another econ-001 student, supports this intervention saying: “a subsidy will increase production of the HPV vaccine, decrease the price to consumers and, if set correctly, be efficient.” Evaluate each of her statement using your graph.

Q

Answer Key:

a. Natural Monopoly

Points: 4

b. MC a horizontal line at a low value. ATC starts high and declines toward MC asymptotically. Downward sloping demand line with MR line inside of it. Q^* marked at the intersection of MC and MR. P^* market as the price on the demand line at a quantity of Q^* .

Points: 8

MC constant:1; ATC consistent:1; D & MR: 2 (1 each); Q at MC=MR:2; P at D curve:2

c. Student should mark a price P' below P^* .

The firm is a price setter in this case and is not producing efficiently. Note that setting a price ceiling would make this firm a price taker. None of the results stated above would hold in this case. In this case, quantity supplied would actually increase to where P' hits the demand line. Quantity supplied increases and there is no excess demand. Since the price P' is closer to MC, deadweight loss actually falls.

Points:9

Drawing the price ceiling as a horizontal line at $p' < p^*$:2

Understanding implication on Q s:3 (if only state Q increases w/o relating clearly to graph:1 point)

No excess demand:1

Smaller DWL:3 (graph DWL correctly:2 compare to see that the price ceiling did not cause DWL, but actually reduced it, 1 point)

d. There are two possible ways to interpret the per unit subsidy, either as a shift out of the demand, and therefore, the MR curve or as a shift down of MC.

Either way: what the government is doing is shifting the point where $MR=MC$ thereby changing the firm's profit maximizing function and therefore its production point. At a bigger MR (or lower MC) the firm will produce *more* which means the price has to fall for the consumers.

Note that if set correctly there will be no DWL.

Points:9

Understanding that this is a shift of D & MR (or MC):3 (only 1 point if shift D but not MR)

Finding new Q' that is greater than previous Q :1

Price lower:2 (remember P to consumer falls!, if show P for firm increases 1 point).

$Q' = Q^{eff}$:3 (For full credit need to show case where subsidy leads to efficiency. Otherwise the max here is 2/3)

Note: a student who assumed that the tax is a fixed lump sum tax will get a max of 3 points.