

**ECON 001**  
**Fall 2019**  
**Midterm 2**  
**November 5, 2019**  
**Time Limit: 60 Minutes**

**Name (Print):** \_\_\_\_\_  
**Recitation Section:** \_\_\_\_\_  
**Name of TA:** \_\_\_\_\_

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- This exam contains 7 pages (including this cover page) and 10 questions. Check to see if any pages are missing.
  - The exam is scheduled for 1 hour.
  - This is a closed-book, closed-note, no calculator exam.
  - Answer each multiple choice question by writing the correct answer on the line at the right margin of the corresponding question. Make sure that your answer is clearly written or it will be marked incorrect.
  - Write your answers to the other questions in the spaces provided below them. If you don't have enough space, continue on the back of the page and state clearly that you have done so.
  - Do not remove any pages or add any pages. No additional paper is supplied
  - Show your work when applicable. Use diagrams where appropriate and label all diagrams carefully.
  - You must use a pen instead of a pencil to be eligible for remarking.
  - This exam is given under the rules of Penn's Honor system.

**My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.**

Please sign here \_\_\_\_\_ Date \_\_\_\_\_

Question	Maximum	Grade
MC (Q1-8)	35	
1st SA (Q9)	30	
2nd SA (Q10)	35	
Total	100	

## Multiple Choice Questions (best 7 out of 8: 35 points)

1. (5 points) Suppose the inverse demand and supply for a drug are given by  $P = 60 - Q_d$  and  $P = 5Q_s$ , respectively. The government imposes a price ceiling of \$30 per unit. Which of the following is true?

- I. The price ceiling is not binding since the equilibrium price without the price ceiling is below \$30.
- II. After the price ceiling is imposed, producers want to sell 24 units fewer than is demanded.
- III. Lowering the price ceiling would result in more units sold.
- IV. After the price ceiling is imposed, consumer surplus will be higher than producer surplus.

A. Only I.      B. Only II.      C. Only III.      D. Only IV.      E. I and II.  
F. II and III.      G. II and IV.      H. All of the above.      I. None of the above.

1.     **G**    

2. (5 points) Which of the following statements is correct (assume a curved out PPF)?

- I. Specialization according to comparative advantage and international trade allow a country to produce outside its production possibilities frontier
- II. Specialization according to comparative advantage and international trade allow a country to consume outside its production possibilities frontier

A. Only I.      B. Only II.      C. Both I and II.      D. Neither statement is correct.

2.     **B**    

3. (5 points) Suppose that Country A has 200 workers and Country B has 100 workers. Given their workforce, Country A can produce 200 bushels of corn or 800 barrels of maple syrup. Similarly, with their workforce, Country B can produce 250 bushels of corn or 500 barrels of maple syrup. Suppose the two countries trade with each other. Which of the following are true?

- I. Country A has an absolute advantage in maple syrup.
- II. Country B has an absolute advantage in maple syrup.
- III. Country A specializes in corn.
- IV. Country B specializes in corn.

A. I and III.      B. I and IV.      C. II and III.      D. II and IV.      E. None of them is true.

3.     **D**    

4. (5 points) The demand and supply of melons in the U.S. are  $Q_d = 60 - 5P$  and  $Q_s = 10 + 5P$ , where  $P$  is measured in dollars per pound. Suppose that melons trade on the world market at a price of \$2 per pound. To protect domestic farmers, the U.S. government imposes a tariff of \$2 per pound on imported melons. What is the tariff revenue of the U.S. government?

- A. \$60.
- B. \$40.
- C. \$20.
- D. \$0.

4.     **C**

5. (5 points) Consider a perfectly competitive market for coffee. Assume that there are no externalities in the market. The government plans to provide a per-unit subsidy to coffee producers. Consumer organizations criticize this policy by arguing that it is beneficial only for producers *and* it generates a deadweight loss. Which of the following assumptions can justify the consumer organizations' argument?
- A. The demand is perfectly inelastic and the supply is upward sloping.
  - B. The demand is downward sloping and the supply is perfectly inelastic.
  - C. The demand is perfectly elastic and the supply is upward sloping.
  - D. The demand is downward sloping and the supply is perfectly elastic.
  - E. None of the above.

5.     **C**    

6. (5 points) Cows release much greenhouse gas and are one of the causes of global warming. Which of the following *cannot* help achieve the efficient level of milk consumption?
- A. Imposing a sales tax on milk.
  - B. Imposing a subsidy on milk.
  - C. Setting a binding minimum price for milk.
  - D. Setting a binding maximum price for milk.

6.     **B**    

7. (5 points) Responding to student exhaustion, the Penn administration is considering adding enough napping pods throughout campus so that any student who wanted to catch a quick nap in between classes could do so. The total cost of installing all nap pods is \$500,000. Suppose Penn has 2000 undergraduate students per class, and that freshman and sophomores value nap pods at \$10 each, while juniors and seniors value them at \$100 each. Treating nap pods as a public good, what should Penn do in order to reach the efficient outcome?
- A. Pay for the nap pods because the social benefit exceeds the private cost.
  - B. Pay for the nap pods because the social benefit exceeds the social cost.
  - C. Abandon the project because the social cost exceeds the social benefit.
  - D. Abandon the project because the social cost equals the private benefit.

7.     **C**    

8. (5 points) Suppose Uber is a single price monopolist in the market for ride shares, facing inverse market demand  $P = 12 - Q$ , and marginal cost  $MC = 2Q$ . By reducing traffic congestion, ride shares services generates a positive externality, such that the social marginal cost is  $SMC = Q$ . Suppose the monopolist is currently producing at the quantity where there is zero deadweight loss. What can the monopolist do to raise profits?
- A. Decrease quantity produced.
  - B. Increase quantity produced.
  - C. Do nothing: it is already maximizing profit since there is zero deadweight loss.
  - D. Cut prices to raise profits.
  - E. None of the above.

8.     **A**

## Short Answer Questions (65 points total)

To get any point you must show your work

9. Consider two tech companies, iMega and iTech which can either produce headphones or laptops. The table below shows how many headphones and laptops they are able to produce per hour:

	Headphones	Laptops
iMega	6	2
iTech	1	1

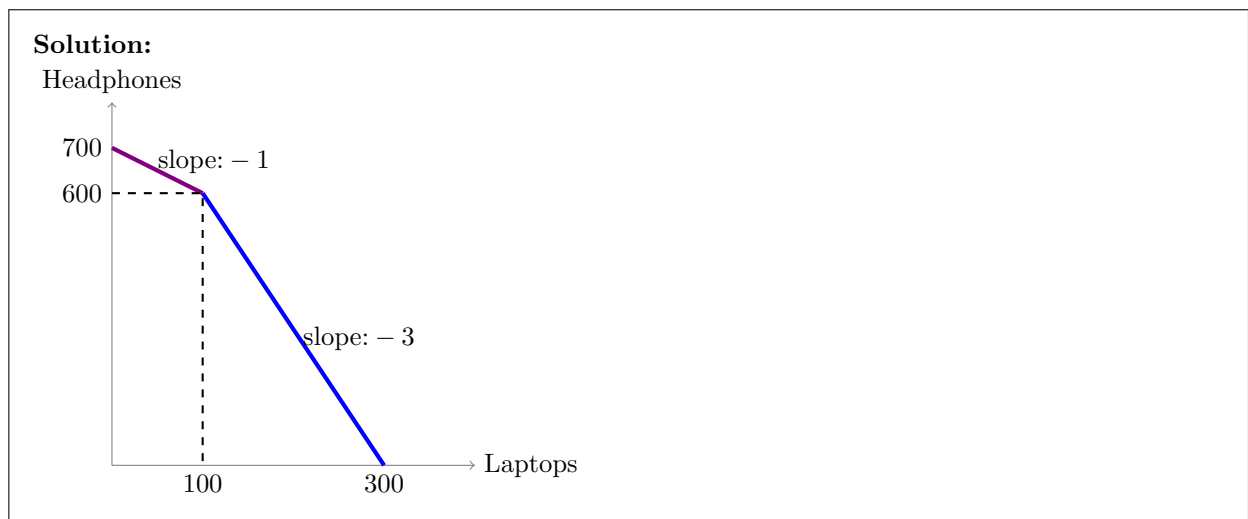
- (a) Which firm has an absolute advantage in Headphones? In Laptops? Explain.

**Solution:** iMega can produce more headphones than iTech in one hour, so it has an absolute advantage in headphones. iMega can also produce more laptops than iTech in one hour, so it also has an absolute advantage in laptops.

- (b) What is the opportunity cost of a laptop (in terms of headphones) for each firm? Which firm has a comparative advantage in each good?

**Solution:** iMega's opportunity cost of 1 laptop is 3 headphones. iTech's opportunity cost of 1 laptop is 1 headphone. Therefore iTech has a comparative advantage in laptops and iMega has a comparative advantage in headphones.

- (c) Suppose the two companies merge and produce jointly. Draw their joint PPF in the graph below, assuming that each firm has 100 hours of work available. For full credit, you must label all points as well as the slopes.



- (d) The firms sign a contract with a big client and commit to providing the client with 200 laptops. What quantity of laptops and headphones will be produced by each firm?

**Solution:** iTech will specialize in laptops and produce 100 laptops and 0 headphone. iMega will produce the remaining 100 laptops, so it will give up 300 headphones and will produce  $600 - 300 = 300$  headphones.

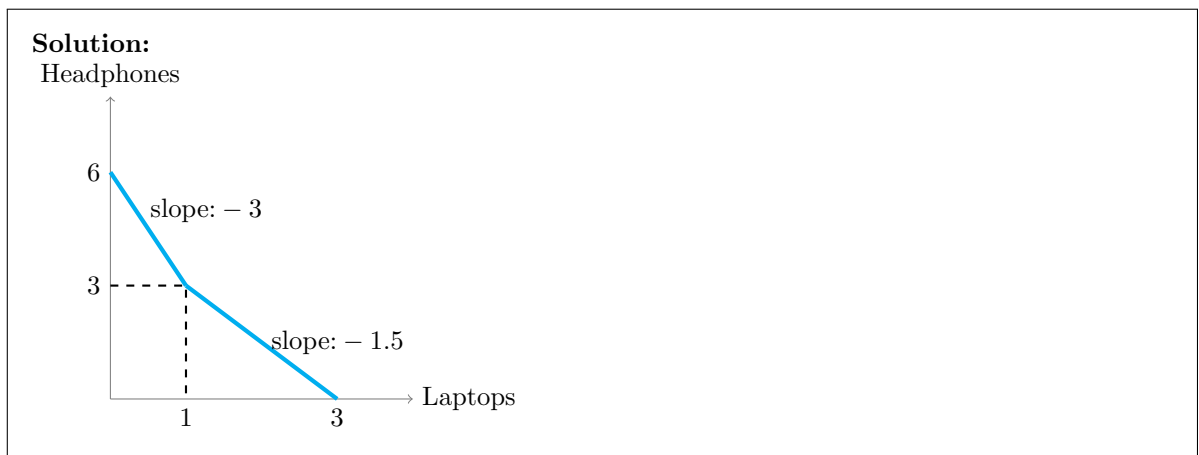
- (e) Suppose instead of merging into a combined PPF, the firms choose to trade with each other. At what range of prices of a laptop (in terms of headphones) would they agree to trade?

**Solution:** The price of a laptop must be between the two opportunity costs so they will trade 1 laptop for at least 1 headphone and at most 3 headphones.

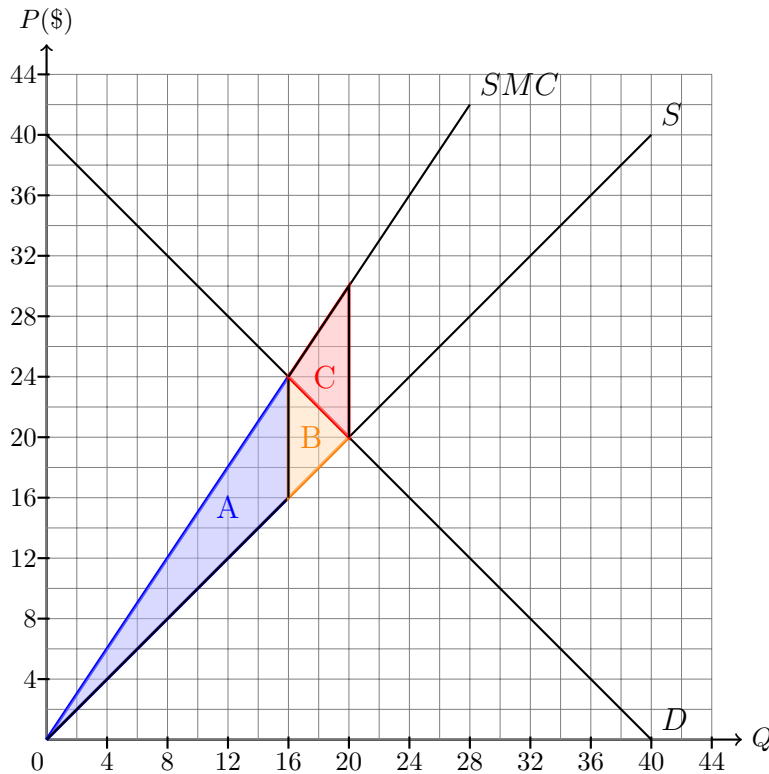
- (f) Now suppose that the productivity of iMega changes as following. It takes iMega 30 minutes to produce the first laptop but it takes 15 min to produce additional laptop after the first one. It still takes iMega 10 minutes to produce one headphone.
- i. Assume iMega has 1 hour of work available. Find its opportunity cost of a laptop (in terms of headphones) for the first 30 minutes, and for the last 30 minutes.

**Solution:** In the first 30 minutes, it is able to produce 1 laptop or 3 headphones, so its opportunity cost of a laptop is 3 headphones. In the last 30 minutes, it is able to produce 2 laptops or 3 headphones, so its opportunity cost of a laptop is 1.5 headphones.

- ii. In the graph below, draw the PPF for iMega, still assuming it has 1 hour of work available. For full credit, you must label all points as well as the slopes.



10. Corn based ethanol creates a negative externality through pollution. Assume that the market is perfectly competitive, and demand, supply, and social marginal cost ( $SMC$ ) curves are linear, as shown in the graph below.



- (a) Find the market equilibrium quantity  $Q^*$  and the socially efficient quantity  $Q_E$ . Is the market equilibrium socially efficient? Why or why not?

**Solution:**  $Q^* = 20$  and  $Q_E = 16$ . The market is not socially efficient because at  $Q^*$ ,  $SMC > SMB$  (the market over-produces).

- (b) Find the deadweight loss at the market quantity  $Q^*$ .

**Solution:**  $DWL = \frac{10 \times 4}{2} = \$20$  (it is the difference between social surplus at  $Q_E$  and social surplus at  $Q^*$ ).

- (c) Suppose the government would like the market to produce the socially efficient quantity  $Q_E$ . Should the government intervene in the market by imposing a per unit tax or per unit subsidy, and of how much?

**Solution:**  
The government should impose a per unit tax equal to the external marginal benefit at  $Q_E$ , so 8/unit.

- (d) On the graph, shade in very clearly the reduction in pollution costs (i.e. external costs) that result from this policy.

**Solution:** The reduction in pollution costs is the difference between external marginal cost at  $Q^*$  and external marginal cost at  $Q_E$ : it is the area between  $SMC$  and  $MC$ , between  $Q_E = 16$  and  $Q^* = 20$

(B+C in the graph).

- (e) Suppose that instead of a tax or subsidy, the government considers implementing a price ceiling to bring market quantity to the efficient level.

i. What level should the price ceiling be?

**Solution:**

Price ceiling should be \$16.

ii. What is the deadweight loss associated with this intervention?

**Solution:**  $DWL = 0$

- (f) Suppose the US government currently subsidizes corn based ethanol production. State *in words* (no math or graphs) whether that policy makes *i*) consumers, *ii*) producers, *iii*) the government, and *iv*) society better or worse off than at the market output  $Q^*$ .

**Solution:**  $CS, PS$  are higher than at market equilibrium. Government subsidies make their finances worse off. Society as a whole is worse off because the increased production exacerbates the external costs to society.