

ECON 001
Spring 2019
Midterm 2
April 2, 2019

Time Limit: 60 Minutes

Name (Print): _____

Recitation Section: _____

Name of TA: _____

- 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)	35	
2nd SA (Q10)	30	
Total	100	

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

1. (5 points) Suppose that the market for milk is perfectly competitive. Suppose that each producer's total cost is given by $TC(q) = 4 + q + q^2$ and each producer's output (q^*) in the long-run equilibrium is 2. Find the long-run equilibrium price P^* .

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

1. **E**

2. (5 points) Suppose the market for gasoline in the United States characterized by a downward sloping linear demand and upward sloping linear supply beginning at the origin. Currently gas costs consumers \$3 per gallon, the U.S. consumes 150 billion gallons, and demand is price-inelastic. In an effort to curb emissions and raise revenue, the government imposes a gasoline tax of \$1 per gallon on producers. Which of the following could be true after the tax?

- A. Consumers now pay \$4 per gallon
- B. The U.S. consumes 50% less gasoline
- C. Consumers now pay \$3.50 per gallon
- D. The U.S. government raises \$120 billion in revenue

2. **D**

3. (5 points) Suppose that the perfectly competitive market for apples has a downward sloping demand and upward sloping supply. Suppose that supply is more elastic than demand, and there are no externalities in the market. If the government provides a per-unit subsidy to apple farmers, which of the following statements must be true?

- I. Quantity of apples consumed increases
 - II. Buyers will benefit more from the subsidy than sellers
 - III. There will be a deadweight loss
- A. I only B. II only C. III only D. I and II
E. I and III F. II and III G. I, II, and III

3. **G**

4. (5 points) Oceanland is a small country capable of producing 5 shells or 3 oranges at a constant opportunity cost. In the world market, the price of a shell is 1 orange. After opening up the economy, which of the following is optimal for Oceanland to do:

- A. Import shells, export oranges
- B. Import oranges, export shells
- C. Produce both domestically
- D. None of the above

4. **B**

5. (5 points) The domestic demand for cigarettes is $P = 10 - Q$ and the domestic supply is $P = Q$. The market is perfectly competitive and in domestic equilibrium with no trade. Which of the following will allow the government to decrease domestic consumption of cigarettes?

- I. Impose a price floor of \$4
- II. Impose a price ceiling of \$4
- III. Allow all of the cigarette companies to merge into a profit-maximizing monopoly
- IV. Allow for free trade of cigarettes at the world price of \$4

- A. I only B. II only C. III only D. I and II E. I and III
- F. II and III. G. III and IV H. II, III and IV

5. **F**

6. (5 points) A firm is producing a quantity where its marginal revenue is less than its marginal cost. Assume there is no government intervention. Under which of the following scenarios may this be the profit maximizing quantity?

- A. The firm is a monopoly and there is a negative externality
- B. The market is perfectly competitive and there is a positive externality
- C. Marginal revenue is zero
- D. None of the above

6. **D**

7. (5 points) Suppose Hershey is a single price monopolist in the U.S. chocolate industry. Facing criticism from the public, the regulator is thinking about what would help alleviate consumer concerns regarding the price:

- A. Give the firm a lump sum subsidy, reducing the costs for the company
- B. Give the firm a per-unit subsidy, reducing the costs for the company
- C. Tax the monopolist, to reach efficient quantity
- D. Do nothing, since the monopolist is already maximizing profit and hence maximizing total surplus

7. **B**

8. (5 points) The market for widgets is monopolistic. The monopolist develops a technology that allows it to perfectly price discriminate against consumers. The government considers banning the price discrimination technology. Which of the following could be the government's justification for the ban?

- I. The perfectly price discriminating monopolist will choose an inefficient quantity
- II. Perfect price discrimination creates a deadweight loss
- III. Total surplus is higher without the price discrimination technology
- IV. The government is trying to protect consumers

- A. I only B. II only C. III only D. IV only E. I and II
- F. II and III G. II, III and IV H. I, II, III and IV

8. **D**

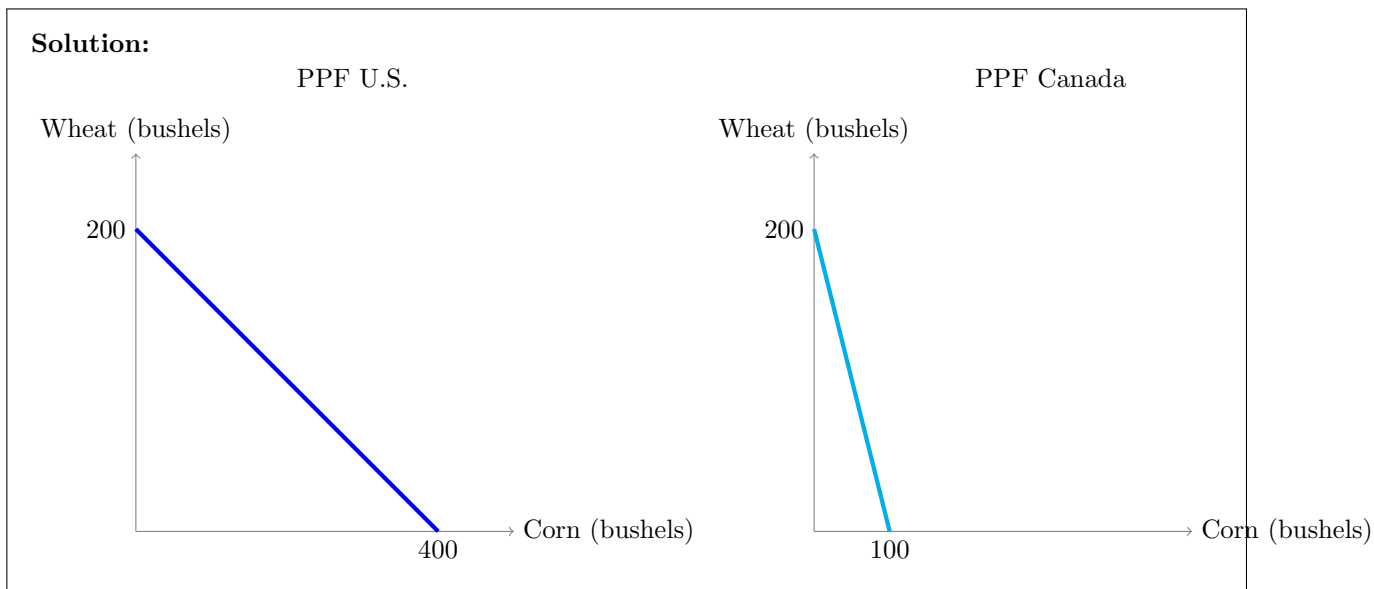
Short Answer Questions (65 points total)

To get any point you must show your work

9. Suppose the United States and Canada’s production possibilities for corn and wheat are summarized by the following table:

	Corn (bushels per acre)	Wheat (bushels per acre)	Acres
United States	2	1	200
Canada	1	2	100

(a) Graph the PPF of each country below. Label all intercepts.



(b) Find the opportunity costs for each country and complete the following table. Who has comparative advantage in corn production? Who has comparative advantage in wheat production?

Solution:

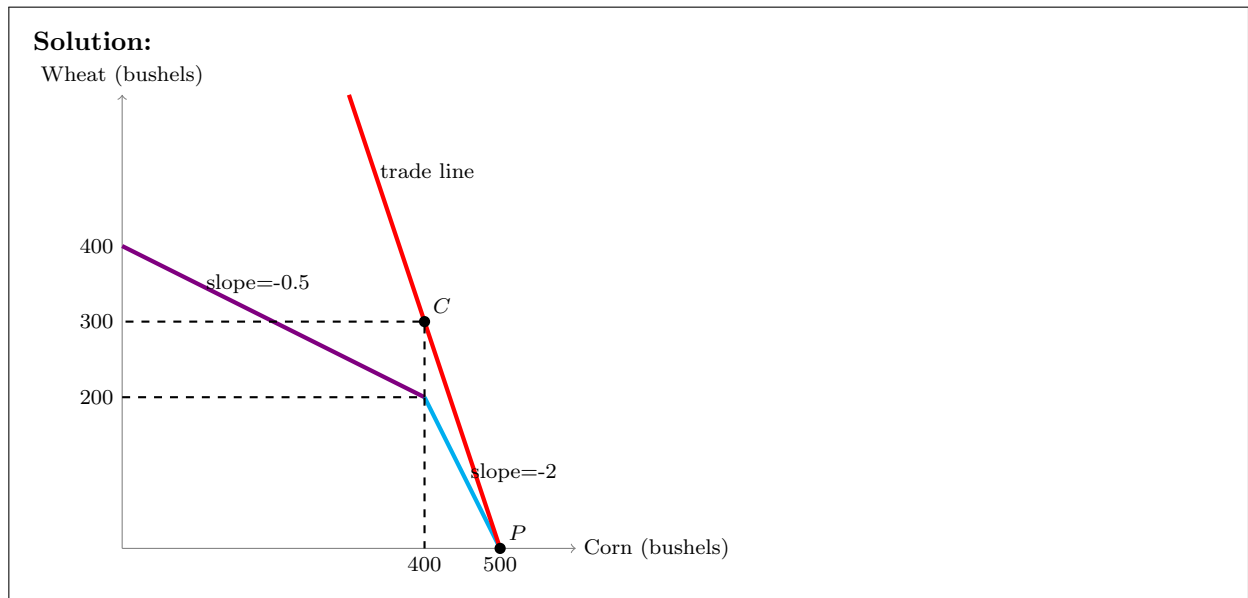
Opportunit cost of:	1 bushel of corn	1 bushel of wheat
United States	0.5 bushels of wheat	2 bushels of corn
Canada	2 bushels of wheat	0.5 bushel of corn

The US has comparative advantage in corn production, and Canada has comparative advantage in wheat production.

(c) If the two countries trade with each other, what are the terms of trade (wheat per unit of corn) that benefit both countries?

Solution: The terms of trade must be between their opportunity costs: between 0.5 and 2 bushels of wheat per bushel of corn.

(d) Suppose that Canada and the U.S. join their productions of wheat and corn. On the graph below, draw the joint PPF of the United States and Canada. For full credit, you must label all points as well as the slopes.



- (e) **In this part only**, suppose there is a drought in the United States, and now only 100 acres are usable for agricultural production. Describe *in words* how this affects the terms of trade you found in part (c) and the joint PPF you drew in part (d). Justify your answer.

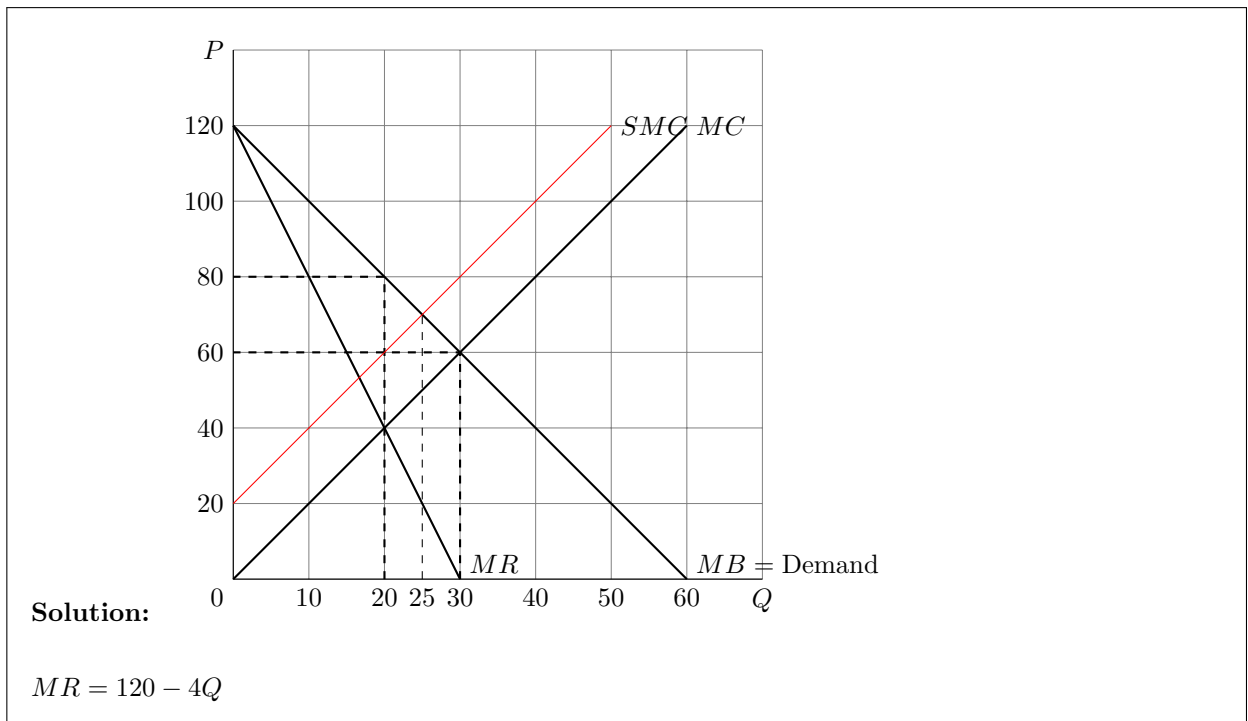
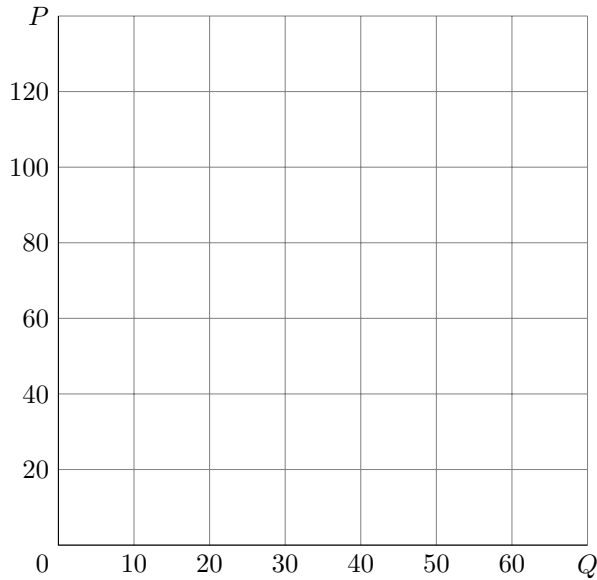
Solution: The drought does not affect the opportunity costs of each country, so the terms of trade are unchanged. The joint PPF is affected by the drought as now the U.S. produces half as many units of corn and wheat, so the joint PPF shifts in.

- (f) **Consider the situation before the drought (you can ignore part (e)).** Suppose Canada and the U.S. start trading with the rest of the world. Given the world price of corn (in terms of wheat), they decide to jointly specialize in one of the two goods, and then export 100 bushels of corn and import 300 bushels of wheat. What is the world price of corn? Draw the trade line in the graph from part (d), label their point of production P and their point of consumption C .

Solution: They export corn and import wheat, so they must specialize in corn. So their production point is at (0,500) and their consumption point is at (400,300). Therefore, the slope of the trade line is -3 (see graph) so the world price of 1 bushel of corn is 3 bushels of wheat.

10. Aviation Alvonía (AA) is a single price monopolist constructing airports in the country of Alvonía. The demand for constructing airports is given by $P = 120 - 2Q$. The marginal cost of constructing an airport is $MC = 2Q$.

(a) Model the market for airports in Alvonía graphically. Label MC , MR and demand curves.



(b) How many airports Q_M does AA construct to maximize profits? What price P_M do they charge?

Solution: Q_M is such that $MR = MC \Rightarrow 120 - 4Q = 2Q \Rightarrow Q_M = 20$. P_M is found by plugging Q_M back into the demand equation: $P_M = 120 - 2Q_M \Rightarrow P_M = 80$.

(c) What is the total surplus at this quantity? Show your work.

Solution: Total surplus is the area below demand and above MC , bounded by Q_M : $TS = (120 - 80) * 20 * 0.5 + (80 - 40) * 20 + 40 * 20 * 0.5 = 1600$.

Suppose that the noise and air pollution associated with airports generate a harm on people living nearby, captured by the marginal external cost $MEC = 20$.

- (d) Write the equation of the social marginal cost SMC and plot it in the graph from part (a). What is the socially efficient quantity Q_E ?

Solution: The social marginal cost is $SMC = MC + MEC = 2Q + 20$. See graph. Q_E is such that $MB = SMC \Rightarrow 120 - 2Q = 2Q + 20 \Rightarrow Q_E = 25 > Q_M$.

- (e) Suppose you intern at the Office of the Chief Economist. The team is considering a Pigovian subsidy or a Pigovian tax. Which would you recommend? Why, and how much should it be?

Solution: The monopolist under-produces ($Q_M < Q_E$), so to achieve efficiency the government must increase production, and therefore it should give the firm a Pigovian subsidy. The subsidy should be such that $MC - s = MR$ at Q_E : $2Q_E - s = 120 - 4Q_E \Rightarrow 50 - s = 120 - 100 \Rightarrow s = 30$.

- (f) A member of the team recommends opening up the industry to competition, so that the market becomes perfectly competitive, with the same market demand as previously ($P = 120 - 2Q$), and a market supply $P = 2Q$ (the same equation as the MC of the monopoly). Explain how this change affects your answer to part (e).

Solution: The perfectly competitive market would produce Q_{PC} such that $MB = MC \Rightarrow 120 - 2Q = 2Q \Rightarrow Q_{PC} = 30 > Q_E$. So the perfectly competitive market would over-produce. Therefore the government should use a Pigovian tax, in order to decrease production. The per-unit tax should be equal to the MEC at Q_E : $t = 20$.

- (g) The team must choose between the two options (from part (e) and part (f)): which one would you recommend to the government? Why?

Solution: Both options lead to social efficiency. However, the option from part (e) may not be equitable: it involves subsidizing a monopoly, which may not be a popular policy among buyers. The other option involves a tax, which will bring revenue to the government. So that second option may be preferred by the government. There is no right or wrong answer here, as long as efficiency is mentioned, along with equity, and the tax revenue and / or the cost and unpopularity of subsidizing a monopoly.