

## Exam Two

Name \_\_\_\_\_

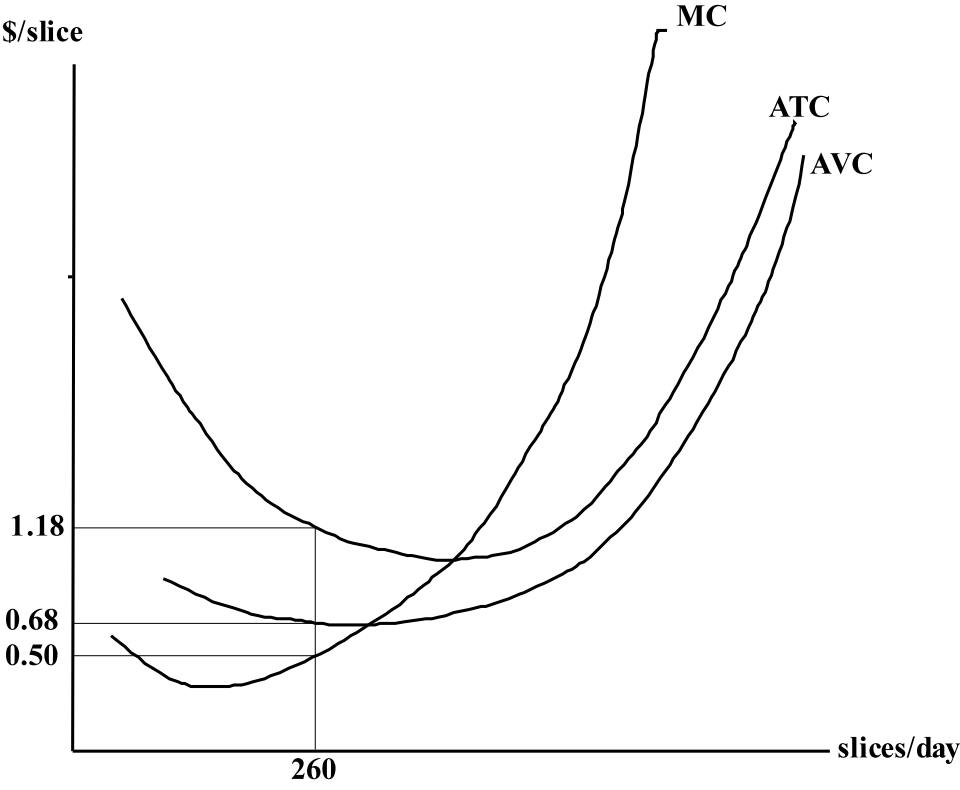
### Chapter 6

1. The supply curves for the only two firms in a competitive industry are  $P = 2 Q_1$  and  $P = 2 + Q_2$ , where  $Q_1$  is the output of firm 1 and  $Q_2$  is the output of firm 2. **Graph** the supply curve for each firm. What is the market supply curve for this industry?

2. A price-taking firm makes air conditioners. Its total costs appear below. The market price for air conditioners is \$120. How many air conditioners should the firm produce per day? What will be its daily profit?

Air conditioners per day	Total cost (\$ per day)
1	100
2	150
3	220
4	310
5	405
6	510
7	650
8	800

3. What is the profit-maximizing level of output and how much daily profit will the producer below earn if the price of pizza is \$0.50/slice?



Chapter 7

4. Suppose the demand for gasoline is  $P = 3.5 - (1/48) Q$  and the supply of gasoline is  $P = 1 + (1/48) Q$ .

a. **Graph** the market for gasoline. What is the equilibrium price and quantity?

b. Calculate and **graph** (above) consumer surplus, producer surplus, and total economic surplus. What is the most that consumers and producers together would be willing to pay for the right to be able to buy and sell gasoline?

5. Refer to Problem 4. Suppose a price ceiling of \$2 is placed on the market for gasoline.

a. Calculate the shortage of gasoline that will result from this policy.

b. Calculate and **graph** consumer surplus, producer surplus, and total economic surplus. Would producers support the price ceiling? Would consumers support the price ceiling?

c. Calculate and **graph** the total economic surplus lost as a result of the price ceiling.

d. Is it possible for consumer surplus to fall in response to a price ceiling? Explain.

6. Refer to Problem 4. Suppose the government decides instead to subsidize gasoline by \$0.50. Sellers receive a subsidy of \$0.50 for every gallon of gasoline sold.

a. What is the equilibrium price and quantity with this subsidy?

b. Calculate and **graph** consumer surplus, producer surplus, and total economic surplus. Would producers support the subsidy? Would consumers support the subsidy?

c. Calculate and **graph** the total economic surplus lost as a result of the subsidy.

d. Is it possible for consumer surplus to fall in response to a subsidy? Explain.

Chapter 8

7. Bert Jones owns and operates a laundry whose monthly revenue is \$9,000. Bert could earn \$4,000 a month elsewhere if he did not run the laundry. Monthly expenses are:

Labor	\$1,700
Electricity	100
Rent	3,300
Interest on loan for equipment	900

a. Calculate Bert's monthly accounting profit.

b. Is the laundry making an economic profit? Should Bert stay in the laundry business? Explain.

c. Suppose Bert had not gotten a loan to buy equipment, but had invested his own money. How would your answers to parts a and b change?

8. Workers in a poor cotton-growing region choose between working in a factory at \$6,000 a year or being a tenant cotton farmer. One farmer can work a 120 acre farm that rents for \$10,000 a year. Such a farm yields \$20,000 worth of cotton each year. The total nonlabor cost of producing the cotton is \$4,000 a year. The local government decides to provide free fertilizer that would triple cotton yields.

a. If the price of cotton is unaffected, how would this program affect the income of tenant farmers in the short run? In the long run?

b. Who would benefit from the program in the long run? How much would they gain each year?

9. You have an opportunity to buy an apple orchard that produces \$25,000 per year in total revenue. To run the orchard, you would have to give up your current job, which pays \$10,000 per year. If you find both jobs equally satisfying, and the annual interest rate is 10 percent, what is the highest price you would be willing to pay for the orchard?

On my honor as an Aggie, I have neither given nor received unauthorized aid on this exam.

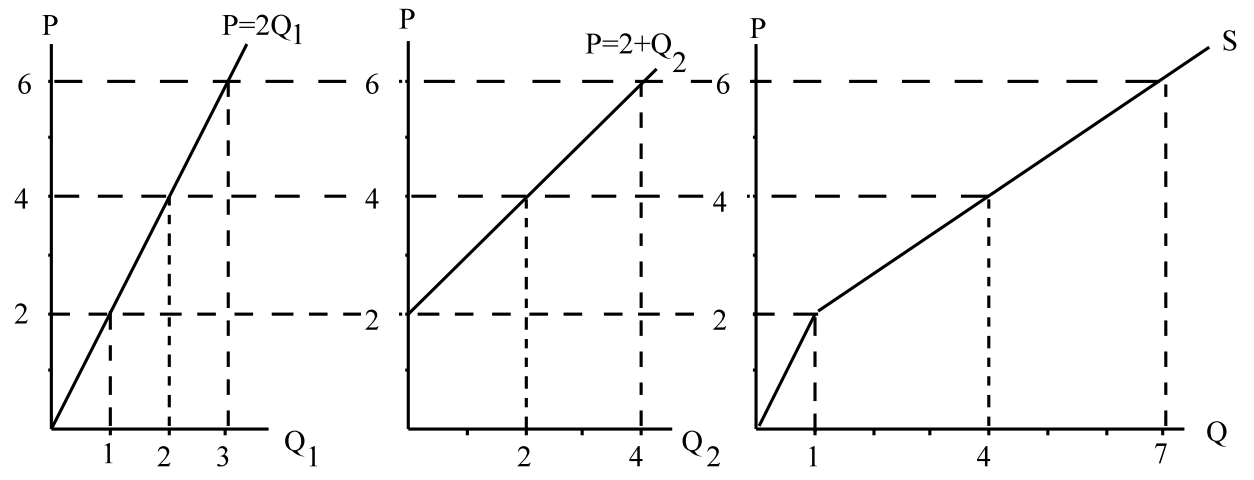
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## Exam Two Solutions

### Chapter 6

1. The supply curves for the only two firms in a competitive industry are  $P = 2Q_1$  and  $P = 2 + Q_2$ , where  $Q_1$  is the output of firm 1 and  $Q_2$  is the output of firm 2. **Graph** the supply curve for each firm. What is the market supply curve for this industry?

*Answer:* The market supply curve (right) is the horizontal summation of the supply curves of the individual market participants.



2. A price-taking firm makes air conditioners. Its total costs appear below. The market price for air conditioners is \$120. How many air conditioners should the firm produce per day? What will be its daily profit?

Air conditioners per day	Total cost (\$ per day)
1	100
2	150
3	220
4	310
5	405
6	510
7	650
8	800

*Answer:* The marginal cost of each of the first 6 air conditioners produced each day is less than \$120, but the marginal cost of the 7<sup>th</sup> air conditioner is \$140. So the company should produce 6 air conditioners per day. Total revenue is price of 120 times quantity of 6 equals 720. Total cost is 510. Daily economic profit is total revenue minus total cost  $720 - 510 = 210$ .

3. What is the profit-maximizing level of output and how much daily profit will the producer below earn if the price of pizza is \$0.50/slice?

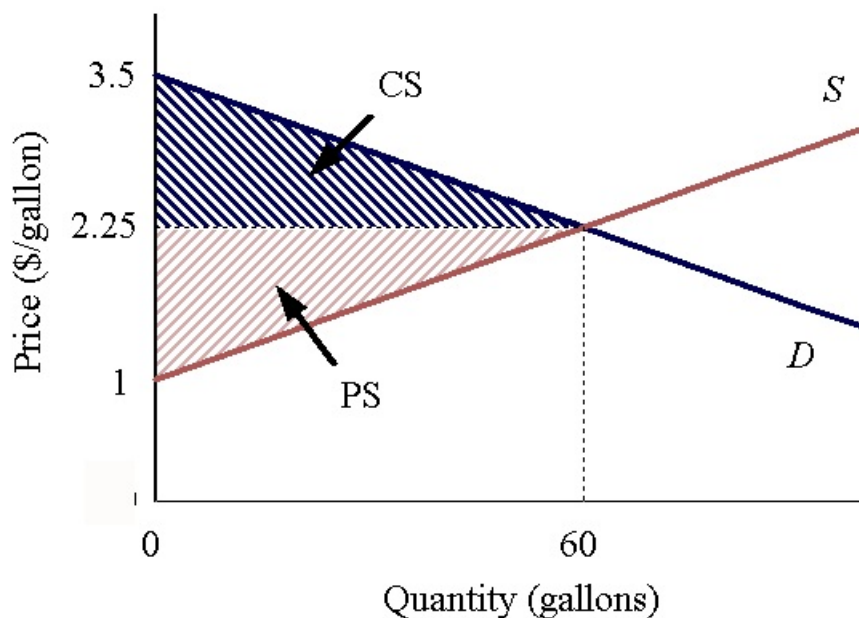
*Answer:* Because price is less than the minimum value of AVC, this producer will shut down in the short run: produce quantity zero. Daily profits are a loss equal to fixed cost. Fixed cost is the difference between total cost and total variable cost.  $TC = Q \times ATC = (260 \text{ slices/day}) (\$1.18/\text{slice}) = \$306.80/\text{day}$  and  $VC = Q \times AVC = (260 \text{ slices/day}) (\$0.68/\text{slice}) = \$176.80/\text{day}$ . So fixed cost =  $\$306.80/\text{day} - \$176.80/\text{day} = \$130/\text{day}$ . This producer's profit is thus  $-\$130/\text{day}$ .

### Chapter 7

4. Suppose the demand for gasoline is  $P = 3.5 - (1/48)Q$  and the supply of gasoline is  $P = 1 + (1/48)Q$ .

a. **Graph** the market for gasoline. What is the equilibrium price and quantity?

*Answer:* Find equilibrium quantity by setting  $3.5 - (1/48)Q = 1 + (1/48)Q$ , so  $(1/24)Q = 2.5$  and  $Q = 60$  gallons. Find equilibrium price by substituting  $Q = 60$  into demand  $P = 3.5 - (1/48)Q = 3.5 - 60/48 = 3.5 - 1.25 = 2.25$  so  $P = \$2.25$ .



b. Calculate and **graph** (above) consumer surplus, producer surplus, and total economic surplus. What is the most that consumers and producers together would be willing to pay for the right to be able to buy and sell gasoline?

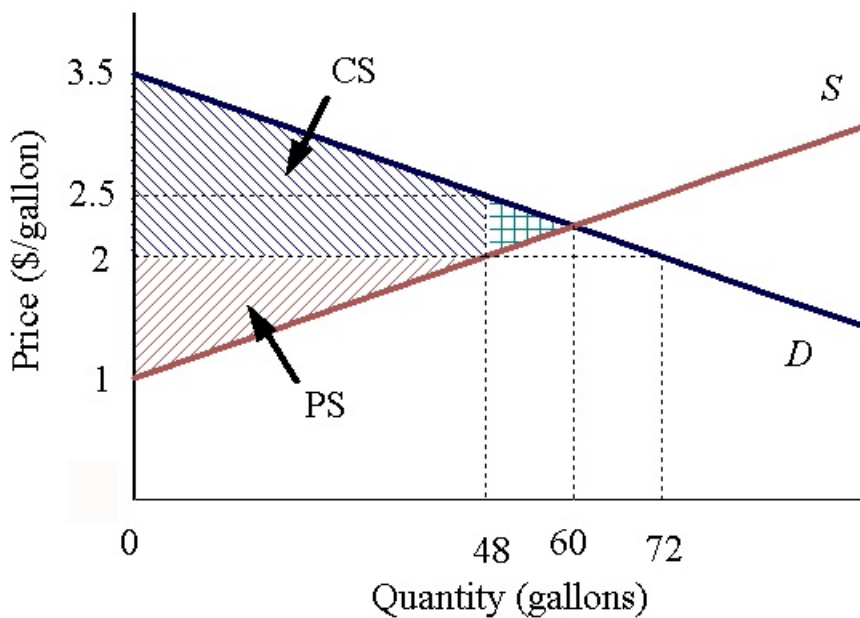
*Answer:* Consumer surplus is the triangular area between the demand curve and the price line. Consumer surplus is  $0.5 (\$3.50 - 2.25) (60) = \$37.50$ . Producer surplus is the triangular area between the supply curve and the price line. Producer surplus is  $0.5 (\$2.25 - 1) (60) = \$37.50$ . Total economic surplus is the sum of consumer surplus and producer surplus  $\$37.50 + 37.50 = \$75$ . Consumers and producers together would be willing to pay 75 dollars for the right to be able to buy and sell gasoline.

5. Refer to Problem 4. Suppose a price ceiling of \$2 is placed on the market for gasoline.  
a. Calculate the shortage of gasoline that will result from this policy.

*Answer:* At a price of \$2, consumers would demand 72 gallons as  $2 = 3.5 - (1/48) Q$  implies  $Q = (3.5 - 2) (48) = 72$ . Producers would supply 48 gallons as  $2 = 1 + (1/48) Q$  implies  $Q = (2 - 1) (48) = 48$ . There will be a shortage of  $72 - 48 = 24$  gallons.

b. Calculate and **graph** consumer surplus, producer surplus, and total economic surplus. Would producers support the price ceiling? Would consumers support the price ceiling?

*Answer:* Consumer surplus is  $0.5 (\$3.5 - 2) (48) + (\$2.5 - 2) (48) = \$48$ . Producer surplus is  $0.5 (\$2 - 1) (48) = \$24$ . Total economic surplus is  $\$48 + \$24 = \$72$ . Producers would not support the price ceiling because producer surplus falls \$13.50 from \$37.50 to \$24. Consumers would support the price ceiling because consumer surplus rises \$10.50 from \$37.50 to \$48.



c. Calculate and **graph** the total economic surplus lost as a result of the price ceiling.

*Answer:* The total economic surplus lost due to the price ceiling is  $\$75 - \$72 = \$3$ . It is the area between the demand and supply curves, and between the new quantity exchanged and the equilibrium quantity.  $0.5 (\$2.5 - 2) (60 - 48) = 0.5 (\$0.5) (12) = \$3$ .

d. Is it possible for consumer surplus to fall in response to a price ceiling? Explain.

*Answer:* Yes, if the price ceiling is set very low, quantity supplied could fall enough so that the cost savings consumers enjoy is outweighed by the reduction in quantity exchanged. In the extreme, if the price ceiling were set at \$1, consumer surplus would be zero!

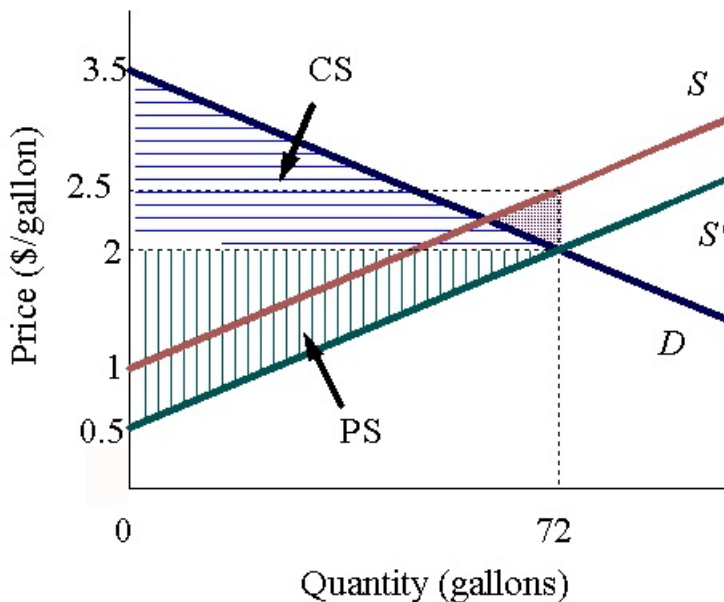
6. Refer to Problem 4. Suppose the government decides instead to subsidize gasoline by \$0.50. Sellers receive a subsidy of \$0.50 for every gallon of gasoline sold.

a. What is the equilibrium price and quantity with this subsidy?

*Answer:* The subsidy shifts the supply curve down by \$0.50, as if costs fell by \$0.50 per gallon. The demand curve and the new supply curve intersect at the equilibrium price  $P = \$2$  and quantity 72 gallons.

b. Calculate and **graph** consumer surplus, producer surplus, and total economic surplus. Would producers support the subsidy? Would consumers support the subsidy?

*Answer:* Consumer surplus is  $0.5 (\$3.5 - 2) (72) = \$54$ . Producer surplus is  $0.5 (\$2 - 0.5) (72) = \$54$ . The subsidy payment required is  $\$0.5 (72) = \$36$ . Total economic surplus is  $\$54 + \$54 = \$108$ , not counting the subsidy payment, or  $\$108 - 36 = \$72$  counting it. Producers would support the subsidy if their other taxes do not go up by more than  $\$54 - \$37.5 = \$16.50$  to finance the subsidy, and similarly for consumers.



c. Calculate and **graph** the total economic surplus lost as a result of the subsidy.

*Answer:* Counting the subsidy payment required, the total economic surplus lost as a result of the subsidy is  $\$75 - \$72 = \$3$ . It is the area between the demand and supply curves, and between the new quantity exchanged and the equilibrium quantity.  $0.5 (\$2.5 - 2) (72 - 60) = 0.5 (\$0.5) (12) = \$3$ . Twelve gallons are sold for which people value less than the true cost of production.

d. Is it possible for consumer surplus to fall in response to a subsidy? Explain.

*Answer:* Yes, if their other taxes go up to pay for the subsidy by more than they gain due to lower price and higher quantity. For example, if consumers bore the full cost of the subsidy payments to sellers, they would gain  $\$16.50$  in the gasoline market but be taxed  $\$36$ , so lose  $\$19.50$ . Either consumers or producers must have taxes go up by more than they gain due to the loss in economic surplus.

## Chapter 8

7. Bert Jones owns and operates a laundry whose monthly revenue is  $\$9,000$ . Bert could earn  $\$4,000$  a month elsewhere if he did not run the laundry. Monthly expenses are:

Labor	\$1,700
Electricity	100
Rent	3,300
Interest on loan for equipment	900

a. Calculate Bert's monthly accounting profit.

*Answer:* Bert's accounting profit is his revenue minus his explicit costs,  $9,000 - 6,000 = \$3,000$ .

b. Is the laundry making an economic profit? Should Bert stay in the laundry business? Explain.

*Answer:* No. Adding the implicit cost of his time to the explicit costs implies that the laundry is making an economic loss of  $\$1,000$ , so Bert should shut down if he can avoid all his explicit costs, or as soon as he can.

c. Suppose Bert had not gotten a loan to buy equipment, but had invested his own money. How would your answers to parts a and b change?

*Answer:* The accounting profit would now be  $\$3,900$ . The answer to part b would not change. If Bert had invested his own money in the laundry, he would forgo  $\$900$  in interest by not putting the money in a savings account. That amount is an opportunity cost that must be included when calculating economic profit.

8. Workers in a poor cotton-growing region choose between working in a factory at \$6,000 a year or being a tenant cotton farmer. One farmer can work a 120 acre farm that rents for \$10,000 a year. Such a farm yields \$20,000 worth of cotton each year. The total nonlabor cost of producing the cotton is \$4,000 a year. The local government decides to provide free fertilizer that would triple cotton yields.

a. If the price of cotton is unaffected, how would this program affect the income of tenant farmers in the short run? In the long run?

*Answer:* A cotton farmer would make a short-run economic profit of \$60,000 revenue - \$10,000 rent - \$4,000 marketing cost - \$6,000 opportunity cost, or \$40,000/yr. In the long run, factory workers would want to move into cotton farming, and would thereby bid up the rent on cotton farms. The rent would continue to rise until it reached \$50,000 per farm. At that point the incentive to leave a factory job would no longer exist, because cotton farmers would again be making zero economic profit.

b. Who would benefit from the program in the long run? How much would they gain each year?

*Answer:* Landowners would reap the long-term benefits of the scheme. Their income would rise by \$40,000/yr per 120-acre plot.

9. You have an opportunity to buy an apple orchard that produces \$25,000 per year in total revenue. To run the orchard, you would have to give up your current job, which pays \$10,000 per year. If you find both jobs equally satisfying, and the annual interest rate is 10 percent, what is the highest price you would be willing to pay for the orchard?

*Answer:* Owning the orchard is owning a stream of  $\$25,000 - \$10,000 = \$15,000$  each year, net of the opportunity cost of your time. The highest you would be willing to pay for the orchard is the value that yields zero economic profit, the value which, invested in a bank at 10 percent interest, would also yield \$15,000 a year. Since  $\$150,000 (0.10) = \$15,000$ , that amount is \$150,000.