

Exam One

Name _____

Chapter 1

1. (8 pts) Residents of your city are charged a fixed weekly fee of \$6 for garbage collection. They are allowed to put out as many cans as they wish. The average household disposes of three cans of garbage per week under this plan. Now suppose that your city changes to a “tag” system. Each can of refuse to be collected must have a tag affixed to it. The tags cost \$2 each and are not reusable. What effect do you think the introduction of the tag system will have on the total quantity of garbage collected in your city? Explain briefly.

2. (12 pts) Consider NASA’s space shuttle launches:
a. Calculate values of average costs to fill in the table.

| Number of launches | Total cost (\$ billions) | Average cost |
|--------------------|--------------------------|--------------|
| 0 | 0 | |
| 1 | 3 | |
| 2 | 7 | |
| 3 | 12 | |
| 4 | 20 | |

b. What is the marginal cost of the first launch? The second? Third? Fourth?

c. If the marginal benefit of each launch is constant at \$4 billion, how many launches should NASA make and why?

Chapter 2

3. (16 pts) Nancy and Bill are auto mechanics. Nancy takes 4 hours to replace a clutch and 2 hours to replace a set of brakes. Bill takes 6 hours to replace a clutch and 2 hours to replace a set of brakes. Determine whether anyone has an absolute advantage at either task and, for each task, determine who has a comparative advantage. Be sure to explain your reasoning.

4. (4 pts) Why is the production possibilities curve (PPC) for a large, multi-person economy typically bow-shaped (curved outward)?

Chapter 3

5. (3pts) How would an increase in the wage paid to workers on oil rigs affect the market supply for crude oil? Does the supply curve shift left or right and why? What will happen to the equilibrium price and quantity of crude oil?

6. (3 pts) How would a decrease in the price of hybrid cars (with high gas mileage) affect the market demand for gasoline? Does the demand curve for gasoline shift left or right and why? What will happen to equilibrium price and quantity of gasoline?

7. (4 pts) How would a rise in the price of crude oil affect the market supply for gasoline? Does the supply curve shift left or right and why? What will happen to the equilibrium price and quantity of gasoline if, in addition to the rise in the price of crude oil, there is an increase in population?

8. (20 pts) Consider the effects of a disruption in refining following the recent hurricanes:

| Price of gasoline | Quantity demanded of gasoline | Quantity supplied of gasoline | Reduced quantity supplied of gasoline |
|-------------------|---------------------------------|-------------------------------|---------------------------------------|
| 1.00 | 50 | 35 | 20 |
| 2.00 | 45 | 45 | 30 |
| 3.00 | 40 | 55 | 40 |
| 4.00 | 35 | 65 | 50 |
| (\$ per gallon) | (millions of gallons per month) | | |

a. Use the above table to **graph** demand, supply, and a reduction in the supply of gasoline.

b. What is the original equilibrium price and equilibrium quantity? What is the new equilibrium price and equilibrium quantity? How have price and quantity changed?

c. Suppose the federal government responds by imposing a price ceiling of \$2.00 per gallon. What would be the quantity demanded of gasoline and the quantity supplied of gasoline? How large is the shortage (excess demand) of gasoline?

d. What might be a consequence (downside) of the price ceiling?

Chapter 4

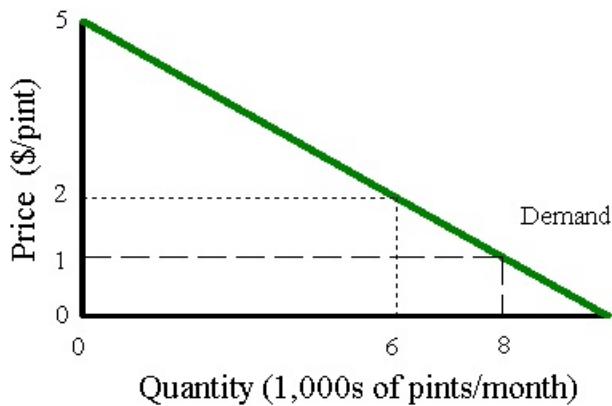
9. (8 pts) **Graph** the demand curve for a cancer-fighting drug, without which lung cancer patients will die. What is the price elasticity of demand for such a drug? What, in general, determines the price elasticity of demand?

10. (6 pts) **Graph** the market for diamonds and the market for water to show how it is possible for the price of water to be much lower than the price of diamonds even though the demand for water is much greater than the demand for diamonds.

Chapter 5

11. (6 pts) Professor Glass gets a total of 200 utils per month from consuming 2 pints of Blue Bell Cookies and Cream Ice Cream and a total of 200 utils per month from consuming 2 pints of Blue Bell Mint Chocolate Chip Ice Cream. The price of the ice cream is \$2 per pint, regardless of flavor. Is she maximizing her utility? If so, explain how you know. If not, how should she rearrange her spending?

12. (10 pts) For the demand curve shown, find the total amount of consumer surplus that results in the ice cream market if ice cream sells for \$2 per pint (and draw on **graph**). Find the total amount of consumer surplus if ice cream sells for \$1 per pint and the change in consumer surplus (and draw both on **graph**).



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

Signature _____

Exam One Solutions

Chapter 1

1. (8pts) Residents of your city are charged a fixed weekly fee of \$6 for garbage collection. They are allowed to put out as many cans as they wish. The average household disposes of three cans of garbage per week under this plan. Now suppose that your city changes to a “tag” system. Each can of refuse to be collected must have a tag affixed to it. The tags cost \$2 each and are not reusable. What effect do you think the introduction of the tag system will have on the total quantity of garbage collected in your city? Explain briefly.

Answer: In the first case, the cost is \$6/week no matter how many cans you put out, so the cost of disposing of an extra can of garbage is \$0. Under the tag system, the cost of putting out an extra can is \$2, regardless of the number of the cans. Since the marginal cost of each extra can is higher under the tag system, we would expect this system to reduce the number of cans collected.

2. (12 pts) Consider NASA’s space shuttle launches:
a. Calculate values of average costs to fill in the table.

| Number of launches | Total cost (\$ billions) | Average cost |
|--------------------|--------------------------|--------------|
| 0 | 0 | 0 |
| 1 | 3 | 3 |
| 2 | 7 | 3.5 |
| 3 | 12 | 4 |
| 4 | 20 | 5 |

b. What is the marginal cost of the first launch? The second? Third? Fourth?

Answer: MC (first) = 3, MC(second) = 7-3 = 4, MC (third) = 12-7 = 5, MC (fourth) = 20-12 = 8

c. If the marginal benefit of each launch is constant at \$4 billion, how many launches should NASA make and why?

Answer: Two, because marginal benefit exceeds marginal cost of launch only up to the second launch.

Chapter 2

3. (16 pts) Nancy and Bill are auto mechanics. Nancy takes 4 hours to replace a clutch and 2 hours to replace a set of brakes. Bill takes 6 hours to replace a clutch and 2 hours to replace a set of brakes. Determine whether anyone has an absolute advantage at either task and, for each task, determine who has a comparative advantage. Be sure to explain your reasoning.

Answer: In time it takes Nancy to replace a set of brakes she can complete one-half of a clutch replacement. So her opportunity cost of replacing a set of brakes is one-half of a clutch replacement. In the time it takes Bill to replace a set of brakes, he can complete one-third of a clutch replacement. So his opportunity cost of replacing a set of brakes is one-third of a clutch replacement. Because Bill's opportunity cost of replacing a set of brakes is lower than Nancy's, Bill has a comparative advantage in replacing brakes. That means that Nancy has a comparative advantage in replacing clutches. Nancy also has an absolute advantage over Bill in replacing clutches, since it takes her two hours less than it takes Bill to perform that job. Since each takes the same amount of time to replace a set of brakes, neither person has an absolute advantage in that task.

4. (4 pts) Why is the production possibilities curve (PPC) for a large, multi-person economy typically bow-shaped (curved outward)?

Answer: Due to increasing opportunity cost. Some resources are better suited for one activity than another. In expanding production of a good, first use resources with the lowest opportunity cost and only afterward turn to resources with higher opportunity costs.

Chapter 3

5. (3 pts) How would an increase in the wage paid to workers on oil rigs affect the market supply for crude oil? Does the supply curve shift left or right and why? What will happen to the equilibrium price and quantity of crude oil?

Answer: An increase in the cost of an input used in crude oil production shifts the supply curve of crude oil to the left (supply decreases), resulting in an increase in the equilibrium price and a decline in the equilibrium quantity of crude oil.

6. (3 pts) How would a decrease in the price of hybrid cars (with high gas mileage) affect the market demand for gasoline? Does the demand curve for gasoline shift left or right and why? What will happen to equilibrium price and quantity of gasoline?

Answer: Due to their high gas mileage, hybrid cars are in a sense a substitute for gasoline. A decrease in the price of a substitute shifts the demand curve to the left (demand for gasoline decreases). Equilibrium price and equilibrium quantity fall.

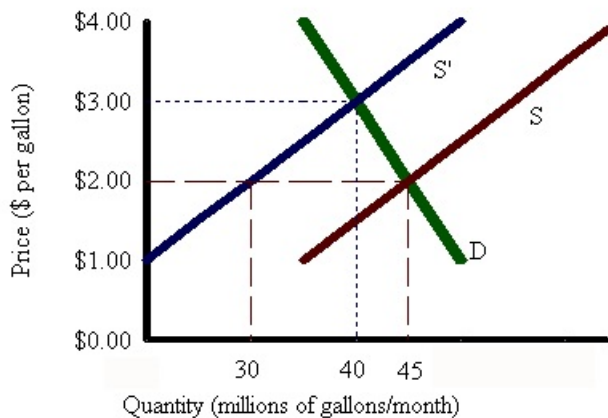
7. (4 pts) How would a rise in the price of crude oil affect the market supply for gasoline? Does the supply curve shift left or right and why? What will happen to the equilibrium price and quantity of gasoline if, in addition to the rise in the price of crude oil, there is an increase in population?

Answer: Crude oil is an input. Higher input prices shift the supply curve to the left (supply decreases). An increase in population shifts the demand curve to the right (demand increases). The decreased supply raises price and reduces quantity while the increased demand increased both price and quantity. The combined effect is that equilibrium price rises and the effect on equilibrium quantity is unclear (could rise or fall).

8. (20 pts) Consider the effects of a disruption in refining following the recent hurricanes:

| Price of gasoline | Quantity demanded of gasoline | Quantity supplied of gasoline | Reduced quantity supplied of gasoline |
|-------------------|---------------------------------|-------------------------------|---------------------------------------|
| 1.00 | 50 | 35 | 20 |
| 2.00 | 45 | 45 | 30 |
| 3.00 | 40 | 55 | 40 |
| 4.00 | 35 | 65 | 50 |
| (\$ per gallon) | (millions of gallons per month) | | |

a. Use the above table to **graph** demand, supply, and a reduction in the supply of gasoline.



b. What is the original equilibrium price and equilibrium quantity? What is the new equilibrium price and equilibrium quantity? How have price and quantity changed?

Answer: The original equilibrium price and equilibrium quantity are $P = \$2.00$ and $Q = 45$ million gallons per month. The new equilibrium price and equilibrium quantity are $P' = \$3.00$ and $Q' = 40$ million gallons per month. Price rose by $\$1.00$ and quantity fell by 5 million gallons per month.

c. Suppose the federal government responds by imposing a price ceiling of $\$2.00$ per gallon. What would be the quantity demanded of gasoline and the quantity supplied of gasoline? How large is the shortage (excess demand) of gasoline?

Answer: At a price of $\$2.00$, quantity demanded would be 45 million gallons per month but quantity supplied would be just 20 million gallons per month. There would be a shortage (excess demand) of $45 - 20 = 25$ million gallons per month.

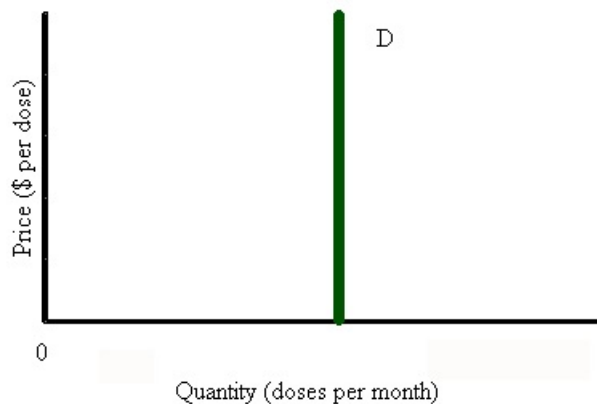
d. What might be a consequence (downside) of the price ceiling?

Answer: Some buyers will be dissatisfied: unable to find gasoline. Time will be wasted waiting in lines and searching for gas stations with gasoline available.

Chapter 4

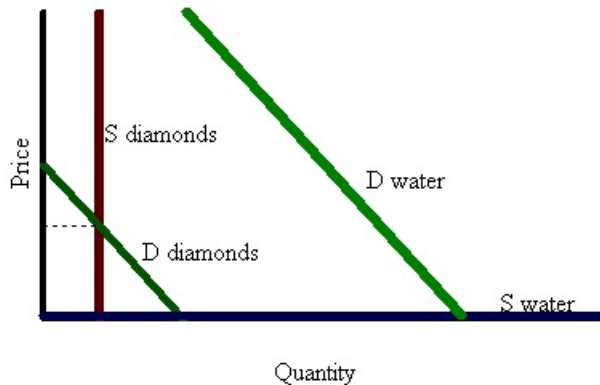
9. (8 pts) **Graph** the demand curve for a cancer-fighting drug, without which lung cancer patients will die. What is the price elasticity of demand for such a drug? What, in general, determines the price elasticity of demand?

Answer: The demand curve would be a vertical (or near vertical) line at the required dosage per month because patients would be willing to pay almost any price to save their lives. The price elasticity of demand for such a drug would be zero (or near zero) as demand is perfectly inelastic (or nearly perfectly inelastic). In general, the price elasticity of demand is determined by availability of substitutes, fraction of income, and adjustment time.



10. (6 pts) **Graph** the market for diamonds and the market for water to show how it is possible for the price of water to be much lower than the price of diamonds even though the demand for water is much greater than the demand for diamonds.

Answer: The supply of diamonds is close to perfectly inelastic (vertical line) due to finite supply, whereas the supply of water is close to perfectly elastic (horizontal line) due to renewable supply.



Chapter 5

11. (6 pts) Professor Glass gets a total of 200 utils per month from consuming 2 pints of Blue Bell Cookies and Cream Ice Cream and a total of 200 utils per month from consuming 2 pints of Blue Bell Mint Chocolate Chip Ice Cream. The price of the ice cream is \$2 per pint, regardless of flavor. Is she maximizing her utility? If so, explain how you know. If not, how should she rearrange her spending?

Answer: The information given enables us to conclude that Professor Glass's average utility per dollar is the same for both flavors of ice cream. But this information does not enable us to say whether her current combination of the two flavors is optimal. To do that, we must be able to compare the respective values of marginal utility per dollar. [Of course, I always maximize utility.]

12. (10 pts) For the demand curve shown, find the total amount of consumer surplus that results in the ice cream market if ice cream sells for \$2 per pint (and draw on **graph**). Find the total amount of consumer surplus if ice cream sells for \$1 per pint and the change in consumer surplus (and draw both on **graph**).

Answer: If ice cream sells for \$2 per pint, consumer surplus is $(1/2)(6,000 \text{ pints/month}) (\$3/\text{pint}) = \$18,000/\text{month}$. If ice cream sells for \$1 per pint, consumer surplus is $(1/2)(8,000 \text{ pints/month}) (\$4/\text{pint}) = \$32,000/\text{yr}$. Consumer surplus has risen by \$14,000/month.

