

SPRING 2013

William Rainey Harper College

# **ECO 211**

**Microeconomics: An Introduction to Economic Efficiency**

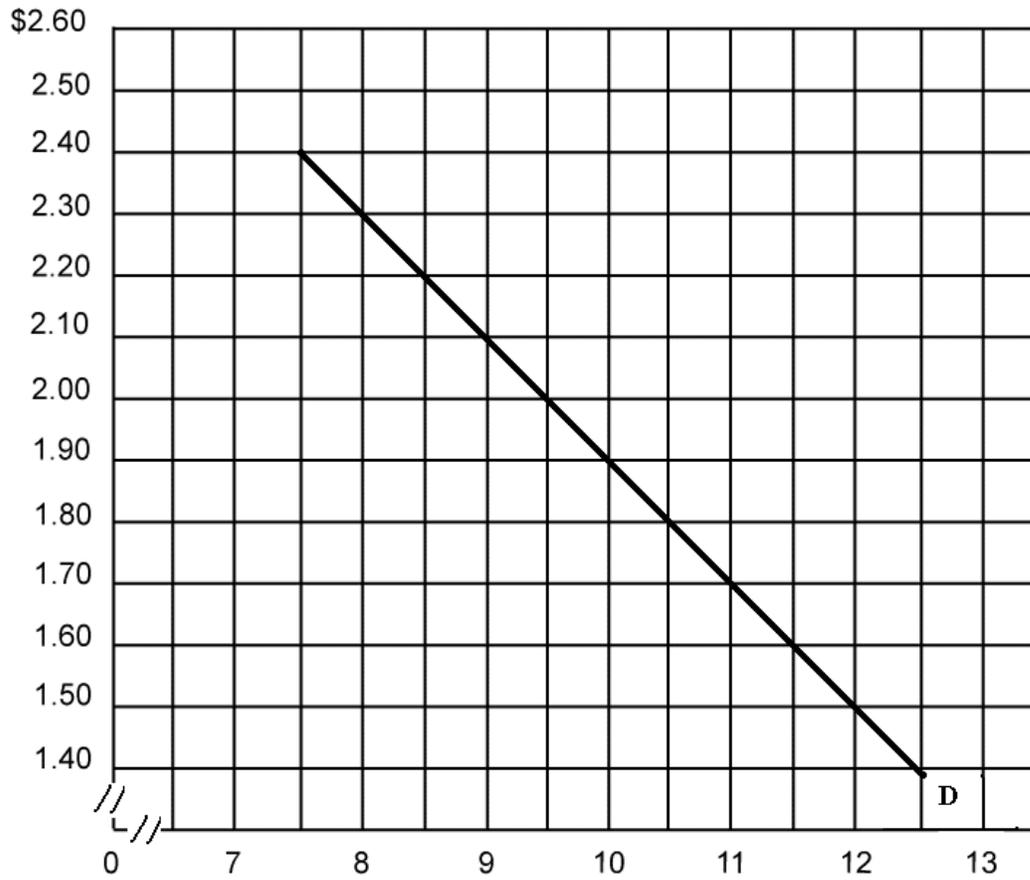
**YELLOW PAGES – UNIT 2**

**Unit 2 - Elasticity, Consumer Decisions, and Costs of Production**

- Chapter 4 - Elasticity
- Chapter 6 - Consumer Behavior
- Chapter 7 – The Costs of Production

Price Elasticity of Demand

4a



Use the graph above to calculate the coefficient of price elasticity of demand for the following price ranges using the midpoint formula:

P1 = \$2.40 Q1 =  
P2 = \$2.30 Q2 =

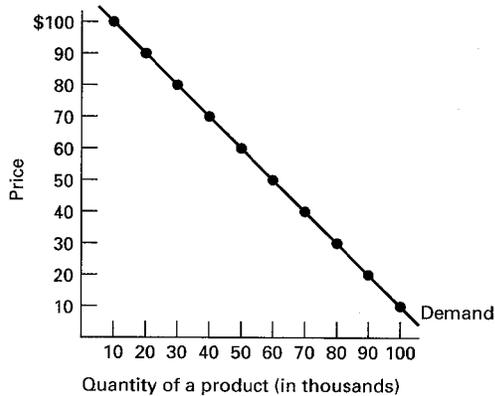
P1 = \$2.00 Q1 =  
P2 = \$1.90 Q2 =

P1 = \$1.50 Q1 =  
P2 = \$1.40 Q2 =

**WORKSHEET**  
**PRICE ELASTICITY OF DEMAND**

4a

1. Use the graph below to answer this question . Assume that the current price is \$70. The seller wants to increase its revenues and has decided to increase the price to \$80. Is this a good idea?
- Calculate the coefficient of price elasticity of demand.
  - Is demand price elastic or inelastic?
  - Calculate the total revenues when the price is \$70 and when the price is \$80.
  - Indicate these total revenues on the graph.]



2. List the determinants of the price elasticity of demand and discuss how they would indicate a more, or less, elastic demand.

(1)

(2)

(3)

(4)

3. Based on the determinants of price elasticity of demand as discussed in the text, guess what the price elasticity of demand of the following products would be (elastic or inelastic?) and state which determinant supports your guess.

(a) ballpoint pens

(b) Crest toothpaste

(c) diamond rings

(d) sugar

(e) refrigerators.

**Elasticity – Quick Quiz**  
**PRICE ELASTICITY OF DEMAND**

4a

**1. Suppose that as the price of Y falls from \$2.00 to \$1.90 the quantity of Y demanded increases from 110 to 118. Then the price elasticity of demand is:**

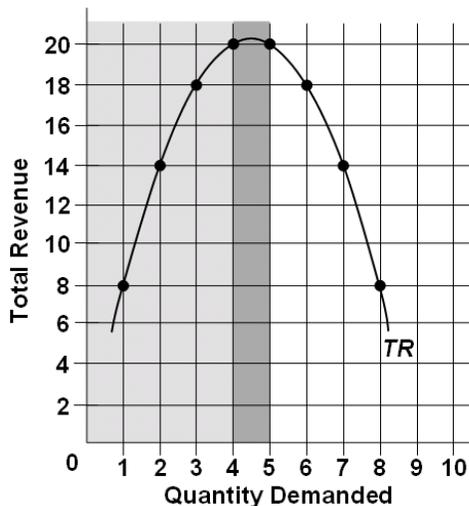
1. 4.00.
2. 2.09.
3. 1.37.
4. 3.94.

**2. The price elasticity of demand of a straight-line demand curve is:**

1. elastic in high-price ranges and inelastic on low-price ranges.
2. elastic, but does not change at various points on the curve.
3. inelastic, but does not change at various points on the curve.
4. 1 at all points on the curve.

**3. If the price elasticity of demand for a product is 0.5, then if the price of the product increases by 10% the quantity demanded will decrease by how much?**

1. 0%
2. 5%
3. 10%
4. 50%



**4. Suppose that the above total revenue curve is derived from a particular linear demand curve. That demand curve must be:**

1. inelastic for price declines that increase quantity demanded from 6 units to 7 units.
2. elastic for price declines that increase quantity demanded from 6 units to 7 units.
3. inelastic for price increases that reduce quantity demanded from 4 units to 3 units.
4. elastic for price increases that reduce quantity demanded from 8 units to 7 units.

**5. If the University Chamber Music Society decides to raise ticket prices to provide more funds to finance concerts, the Society is assuming that the demand for tickets is:**

1. parallel to the horizontal axis.
2. shifting to the left.
3. inelastic.
4. elastic.

**6. The demand schedules for such products as eggs, bread, and electricity tend to be:**

1. perfectly price elastic.
2. of unit price elasticity.
3. relatively price inelastic.
4. relatively price elastic.

**7. The demand for autos is likely to be:**

1. less elastic than the demand for Honda Accords.
2. more elastic than the demand for Honda Accords.
3. of the same elasticity as the demand for Honda Accords.
4. perfectly inelastic.

**8. Which of the following generalizations is *not* correct?**

1. The larger an item is in one's budget, the greater the price elasticity of demand.
2. The price elasticity of demand is greater for necessities than it is for luxuries.
3. The larger the number of close substitutes available, the greater will be the price elasticity of demand for a particular product.
4. The price elasticity of demand is greater the longer the time period under consideration.

**9. A demand curve which is parallel to the vertical axis is:**

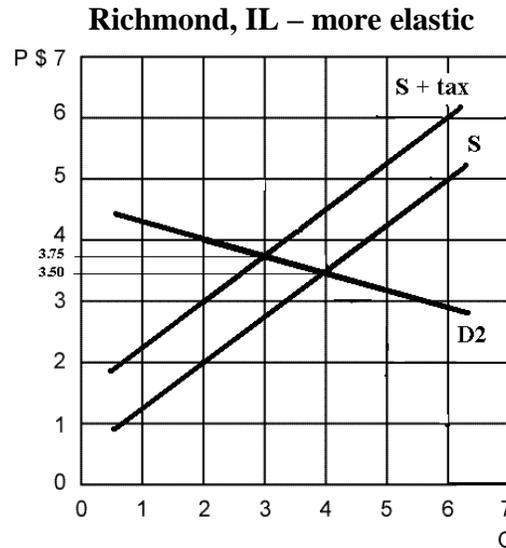
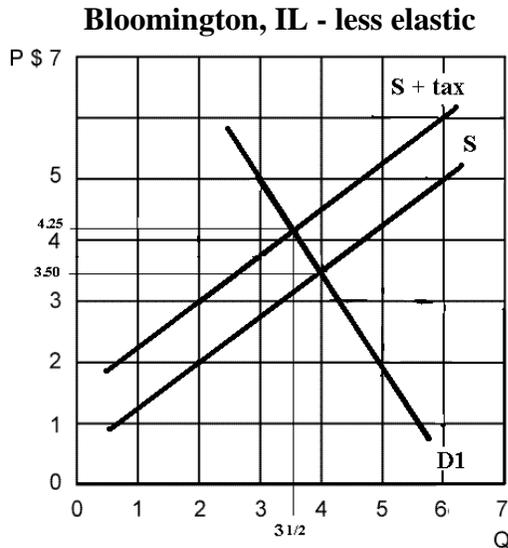
1. perfectly inelastic.
2. perfectly elastic.
3. relatively inelastic.
4. relatively elastic.

**10. If the coefficient of price elasticity is less than 1 but greater than zero, demand is:**

1. perfectly inelastic.
2. perfectly elastic.
3. relatively inelastic.
4. relatively elastic.

**11. Studies of the minimum wage suggest that the price elasticity of demand for teenage workers is relatively inelastic. This means that:**

1. an increase in the minimum wage would increase the total incomes of teenage workers as a group.
2. an increase in the minimum wage would decrease the total incomes of teenage workers as a group.
3. the unemployment effect of an increase in the minimum wage would be relatively large.
4. the cross elasticity of demand between teenage and adult workers is positive and very large.



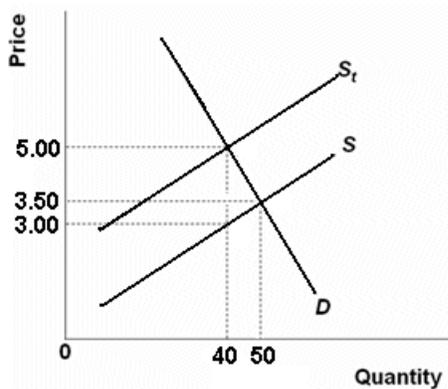
1. When demand is D1 and supply is S, in both towns the:  
 equilibrium price = \_\_\_\_\_ and the equilibrium quantity = \_\_\_\_\_
2. If there are no externalities, what is the:  
 Alloc. Eff. price = \_\_\_\_\_ Alloc. Eff. quantity = \_\_\_\_\_
3. When demand is D1(Bloomington) and a tax has been levied:  
 Equilibrium price = \_\_\_\_\_ equilibrium quantity = \_\_\_\_\_
4. The amount of the excise tax = \_\_\_\_\_
5. The incidence of the tax on consumers in Bloomington = \_\_\_\_\_
6. The incidence of the tax on producers in Bloomington = \_\_\_\_\_
7. The incidence of the tax on consumers in Richmond = \_\_\_\_\_
8. The incidence of the tax on producers in Richmond = \_\_\_\_\_
9. Allocative efficiency was most affected when demand was D1 (less elastic) **or** D2 (more elastic)? \_\_\_\_\_
10. Total tax dollars collected with D1 (less elastic) = \_\_\_\_\_
11. Total tax dollars collected with D2 (more elastic) = \_\_\_\_\_

**SUMMARY**

1. How do you find the amount of the tax?

2. Complete the following table from what you learned on the previous page.

	When demand is price elastic:	When demand is price inelastic:
<p><b><u>Incidence of the tax</u></b> Who pays more of the tax the <u>consumer</u> or the <u>producer</u>?</p>		
<p><b><u>Government Revenue</u></b> Does the government collect <u>more</u> or <u>less</u> in tax revenues?</p>		
<p><b><u>Allocative Inefficiency</u></b> Is allocative efficiency <u>more</u> or <u>less</u> affected by the excise tax?</p>		



1. Refer to the above figure in which  $S$  is the before-tax supply curve and  $S_t$  is the supply curve after an excise tax is imposed. The amount of the tax is:
  1. \$5.00
  2. \$4.00
  3. \$3.00
  4. \$2.00
2. Refer to the above figure in which  $S$  is the before-tax supply curve and  $S_t$  is the supply curve after an excise tax is imposed. The total tax collection from this excise tax will be:
  1. \$200
  2. \$175
  3. \$120
  4. \$ 80
3. Refer to the above figure in which  $S$  is the before-tax supply curve and  $S_t$  is the supply curve after an excise tax is imposed. The burden of this tax is borne:
  1. equally by consumers and producers.
  2. most heavily by consumers.
  3. most heavily by producers.
  4. only by consumers.
4. Refer to the above figure in which  $S$  is the before-tax supply curve and  $S_t$  is the supply curve after an excise tax is imposed. The efficiency loss of the tax can be seen in the fact that after the tax is imposed (assume no externalities):
  1. 50 is the allocatively efficient quantity and 40 is the equilibrium quantity after the tax
  2. 50 is the equilibrium quantity after the tax and 40 is the allocatively efficient quantity
  3. \$3.00 is the allocatively efficient price and \$5.00 is the equilibrium price after the tax
  4. \$5.00 is the allocatively efficient price and \$3.00 is the equilibrium price after the tax

**5. The incidence of a tax pertains to:**

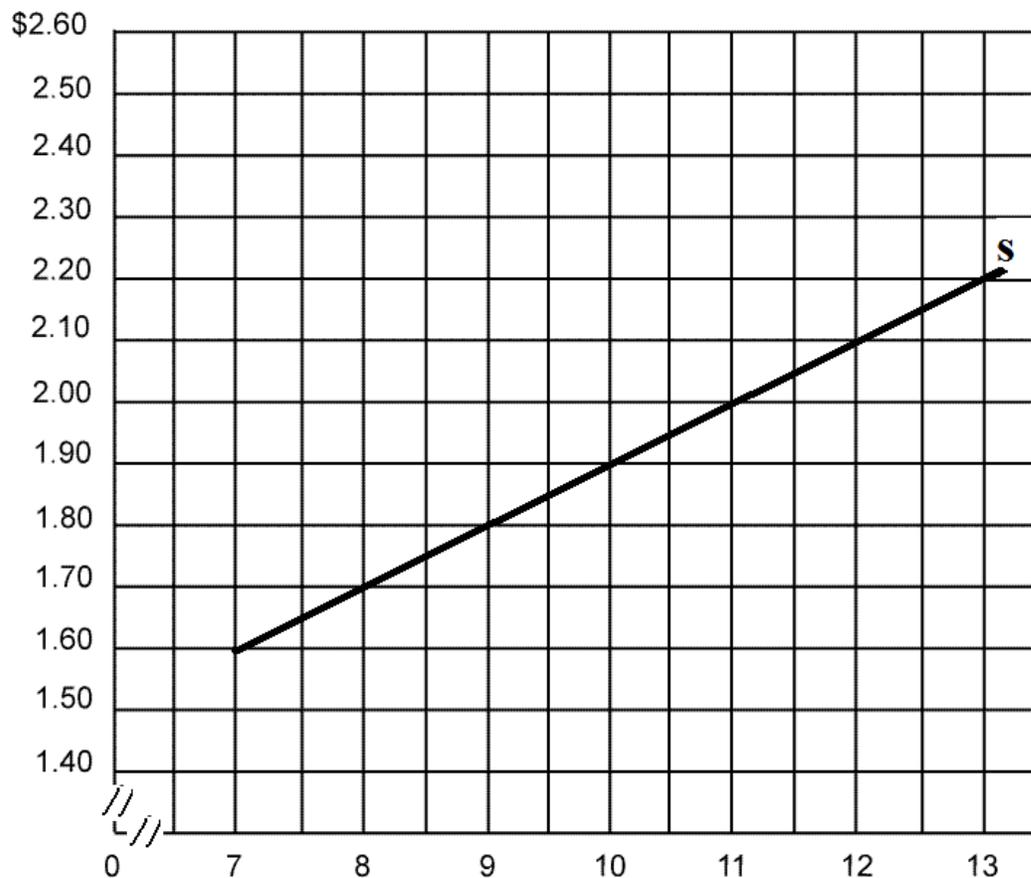
1. the degree to which it alters the distribution of income.
2. how easy it is to evade the tax.
3. who actually bears the burden of a tax.
4. the progressiveness or regressiveness of tax rates.

**6. If the demand for a product is perfectly inelastic and the supply curve is upsloping, a \$1 excise tax per unit of output will:**

1. raise price by less than \$1.
2. raise price by more than \$1.
3. raise price by \$1.
4. lower price by \$1.

**Price Elasticity of Supply**

**4b**



Calculate the price elasticity of supply for the following price ranges:

P1 = \$2.20 Q1 =  
P2 = \$2.10 Q2 =

P1 = \$2.00 Q1 =  
P2 = \$1.90 Q2 =

P1 = \$1.80 Q1 =  
P2 = \$1.70 Q2 =

**WORKSHEET**  
**PRICE ELASTICITY OF SUPPLY**

**4b**

1. List the determinants of the price elasticity of supply and discuss how they would indicate a more, or less, elastic supply.

(1)

(2)

(3)

(4)

2. Explain the difference between the market period, the short run, and the long run as they relate to price elasticity of supply.

3. Based on the following determinants of price elasticity of supply, guess what the price elasticity of supply would be, more elastic or less elastic?

a. ease of storage (market period)

- easy and cheap to store: \_\_\_\_\_
- difficult and expensive to store: \_\_\_\_\_

b. available excess capacity (short run)

- a lot of extra room in the factory: \_\_\_\_\_
- Little extra room in the factory: \_\_\_\_\_

c. characteristics of the production process (long run)

- easy to expand: \_\_\_\_\_
- difficult to expand: \_\_\_\_\_

**Elasticity – Quick Quiz**  
**PRICE ELASTICITY OF SUPPLY**

4b

**1. Suppose the supply of product X is perfectly inelastic. If there is an increase in the demand for this product, equilibrium price:**

1. will decrease but equilibrium quantity will increase.
2. and quantity will both decrease.
3. will increase but equilibrium quantity will decline.
4. will increase but equilibrium quantity will be unchanged.

**2. Suppose that the price of product X rises by 20 percent and the quantity supplied of X increases by 15 percent. The coefficient of price elasticity of supply for good X is:**

1. negative and therefore X is an inferior good.
2. positive and therefore X is a normal good.
3. less than 1 and therefore supply is inelastic.
4. more than 1 and therefore supply is elastic.

**3. Price elasticity of supply is:**

1. positive in the short run but negative in the long run.
2. greater in the long run than in the short run.
3. greater in the short run than in the long run.
4. independent of time.

**4. The supply of known Monet paintings is:**

1. perfectly elastic.
2. perfectly inelastic.
3. relatively elastic.
4. relatively inelastic.

**WORKSHEET**  
**INCOME AND CROSS ELASTICITY**

4b

1. Use the information in the table below to identify the type of cross elasticity relationship between products X and Y and whether demand is cross elastic or cross inelastic in each of the following five cases, A to E.

<u>Cases</u>	<u>Percent change in price of Y</u>	<u>Percent change in quantity demanded of X</u>	<u>Substitutes OR Complements?</u>	<u>Cross Elastic or Inelastic?</u>
A	5	7	_____	_____
B	-9	-6	_____	_____
C	5	-5	_____	_____
D	3	0	_____	_____
E	-2	10	_____	_____

2. Use the information in the table below to identify the income elasticity type of each of the following products, A to E.

<u>Product</u>	<u>Percent change in income</u>	<u>Percent change in quantity demanded</u>	<u>Normal or Inferior?</u>	<u>elastic, inelastic or unit elastic</u>
A	9	12	_____	_____
B	-6	6	_____	_____
C	3	3	_____	_____
D	6	-3	_____	_____
E	-2	-1	_____	_____

**1. Suppose the income elasticity of demand for toys is +2.00. This means that:**

1. a 10 percent increase in income will increase the purchase of toys by 20 percent.
2. a 10 percent increase in income will increase the purchase of toys by 2 percent.
3. a 10 percent increase in income will decrease the purchase of toys by 2 percent.
4. toys are an inferior good.

**2. The formula for cross elasticity of demand is percentage change in:**

1. quantity demanded of X/percentage change in price of X.
2. quantity demanded of X/percentage change in income.
3. quantity demanded of X/percentage change in price of Y.
4. price of X/percentage change in quantity demanded of Y.

**3. Which type of goods is most adversely affected by recessions?**

1. Goods for which the income elasticity coefficient is relatively low.
2. Goods for which the income elasticity coefficient is relatively high.
3. Goods for which the cross-price elasticity coefficient is positive.
4. Goods for which the cross-price elasticity coefficient is negative.

**4. Cross elasticity of demand measures how sensitive purchases of a specific product are to changes in:**

1. the price of some other product.
2. the price of that same product.
3. income.
4. the general price level.

**5. We would expect the cross elasticity of demand between Pepsi and Coke to be:**

1. positive, indicating normal goods.
2. positive, indicating inferior goods.
3. positive, indicating substitute goods.
4. negative, indicating substitute goods.

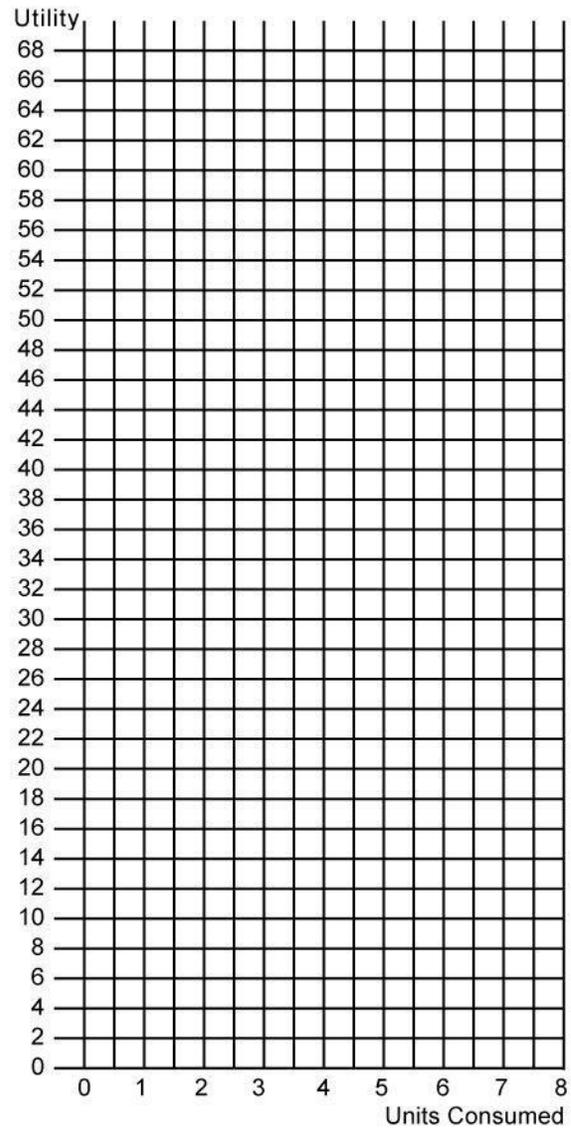
**6. Suppose that a 20 percent increase in the price of good Y causes a 10 percent decline in the quantity demanded of good X. The coefficient of cross elasticity of demand is:**

1. negative and therefore these goods are substitutes.
2. negative and therefore these goods are complements.
3. positive and therefore these goods are substitutes.
4. positive and therefore these goods are complements.

**Total Utility and Marginal Utility**

**6a**

Units Consumed	TU	MU
0	0	--
1	15	_____
2	29	_____
3	42	_____
4	54	_____
5	63	_____
6	66	_____
7	67	_____
8	66	_____



1. Calculate: MU
2. Plot: TU and MU  
(Note: plot MU at the midpoints)
3. Explain the shape of both of the curves.
4. Identify the point where utility is maximized on both curves. Discuss the reasoning behind each value.

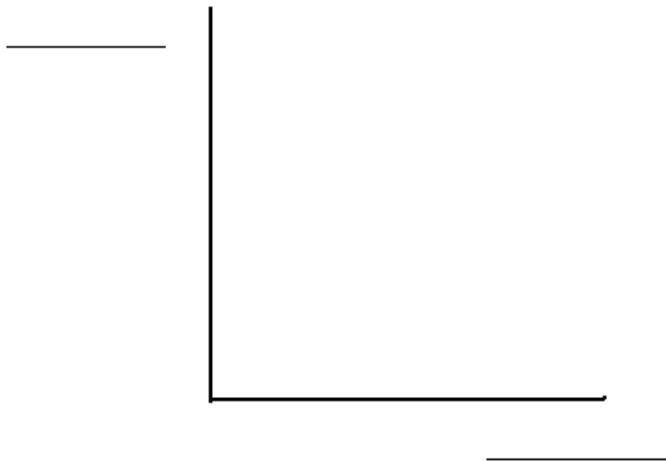
**1. What is UTILITY?**

**2. Define MARGINAL UTILITY and give its FORMULA.**

**3. What is the LAW OF DIMINISHING MARGINAL UTILITY?**

**4.**

**Sketch and Label a Graph of TU and MU**



**5. Can utility be measured?**

**6. Why does a newspaper dispenser open to a stack of newspapers and essentially “trusts” a consumer to take just one copy whereas a soft drink vending machine does not “trust” consumers and dispenses one can for each purchase? Use the concept of diminishing marginal utility in your answer.**

**Quick Quiz**  
**CONSUMER BEHAVIOR**

6a

<u>Units Consumed</u>	<u>Total Utility</u>	<u>Marginal Utility</u>
0	0	-
1	<u>W</u>	20
2	35	<u>X</u>
3	<u>Y</u>	10
4	40	<u>Z</u>

**1. Refer to the above data. The value for Y is:**

1. 25.
2. 30.
3. 40.
4. 45.

**2. Refer to the above data. The value for X is:**

1. 15.
2. 5.
3. 55.
4. 10.

**3. Refer to the above data. The value for W is:**

1. 15.
2. 20.
3. 25.
4. 30.

**4. Refer to the above data. The value for Z is:**

1. -5.
2. +5.
3. -10.
- D. zero.

**5. Marginal utility is the:**

1. sensitivity of consumer purchases of a good to changes in the price of that good.
2. change in total utility obtained by consuming one more unit of a good.
3. change in total utility obtained by consuming another unit of a good divided by the change in the price of that good.
4. total utility associated with the consumption of a certain number of units of a good divided by the number of units consumed.

**6. Where total utility is at a maximum, marginal utility is:**

1. negative.
2. positive and increasing.
3. zero.
4. positive but decreasing.

**7. Newspapers dispensing devices seemingly "trust" people to take only a single paper but the devices actually rely on the law of:**

1. supply.
2. increasing opportunity costs.
3. demand.
4. diminishing marginal utility.

## Utility Maximizing Rule

6a

You have \$10

The price of beer is \$1 per bottle

The price of a steak sandwich is \$3

The utility received from consuming beer and steak is given below.

PROBLEM: How many beers and steak sandwiches should be bought to maximize utility?

Number of Beers	Total Utility beer	MU beer	MU/P beer	Number of Steaks	Total Utility steaks	MU steaks	MU/P steaks
0	0			0	0		
1	15			1	24		
2	24			2	45		
3	32			3	63		
4	39			4	75		
5	45			5	84		
6	47			6	87		

(1) Complete the table above

(2) Calculate the utility maximizing quantities of beer and steak sandwiches when income equals \$10 and the price of beer is \$1 and the price of steak sandwiches is \$3 using the utility maximizing rule.

(3) Calculate the maximum possible TOTAL UTILITY that can be received by this consumer.

**WORKSHEET - Utility Maximization**

6a

1. Write the Benefit-Cost Analysis formula
2. Write the utility maximizing rule formula
3. Explain why the utility maximizing rule is really a version of Benefit-Cost Analysis.
4. Assume that a consumer purchases a combination of products A and B. The  $MU_A$  is 5 and the  $P_A$  is \$5. The  $MU_B$  is 6 and the  $P_B$  is \$6.

What should this consumer do to increase utility? Explain.

5. Assume that a consumer purchases a combination of products Y and Z. The  $MU_Y$  is 50 and the  $P_Y$  is \$25. The  $MU_Z$  is 20 and the  $P_Z$  is \$5.

What should this consumer do to increase utility?

6. Columns 1 through 3 in the table below show the marginal utility which a particular consumer would get by purchasing various quantities of products a, b, and c.

$Q_a$	$MU_a$	$MU_a/P_a$	$Q_b$	$MU_b$	$MU_b/P_b$	$Q_c$	$MU_c$	$MU_c/P_c$
1	18		1	39		1	12	
2	16		2	36		2	10	
3	14		3	33		3	9	
4	12		4	30		4	8	
5	10		5	27		5	7	
7	8		6	24		6	5	
7	6		7	21		7	3	

If the prices of a, b, and c are \$2, \$3, and \$1, respectively, and the consumer has \$26 to spend on these three products, what combination of the three products should be purchased in order to maximize utility and what is the maximum utility possible?

**Quick Quiz**

6a

**UTILITY MAXIMIZATION**

**1. Suppose that Ms. Thomson is currently exhausting her money income by purchasing 10 units of A and 8 units of B at prices of \$2 and \$4 respectively. The marginal utility of the last units of A and B are 16 and 24 respectively. These data suggest that Ms. Thomson:**

1. has preferences that are at odds with the principle of diminishing marginal utility.
2. considers A and B to be complementary goods.
3. should buy less A and more B.
4. should buy less B and more A.

<b>Units of X</b>	<b>Marginal Utility, X</b>	<b>Units of Y</b>	<b>Marginal Utility, Y</b>
1	20	1	16
2	16	2	14
3	12	3	12
4	8	4	10
5	6	5	8
6	4	6	6

**2. Refer to the above data. Assume the price of X is \$2 and the price of Y is \$1 and there is a total of \$9 to spend. What quantities of X and Y should be purchased to maximize utility?**

1. 2 of X and 1 of Y
2. 4 of X and 5 of Y
3. 2 of X and 5 of Y
4. 2 of X and 6 of Y



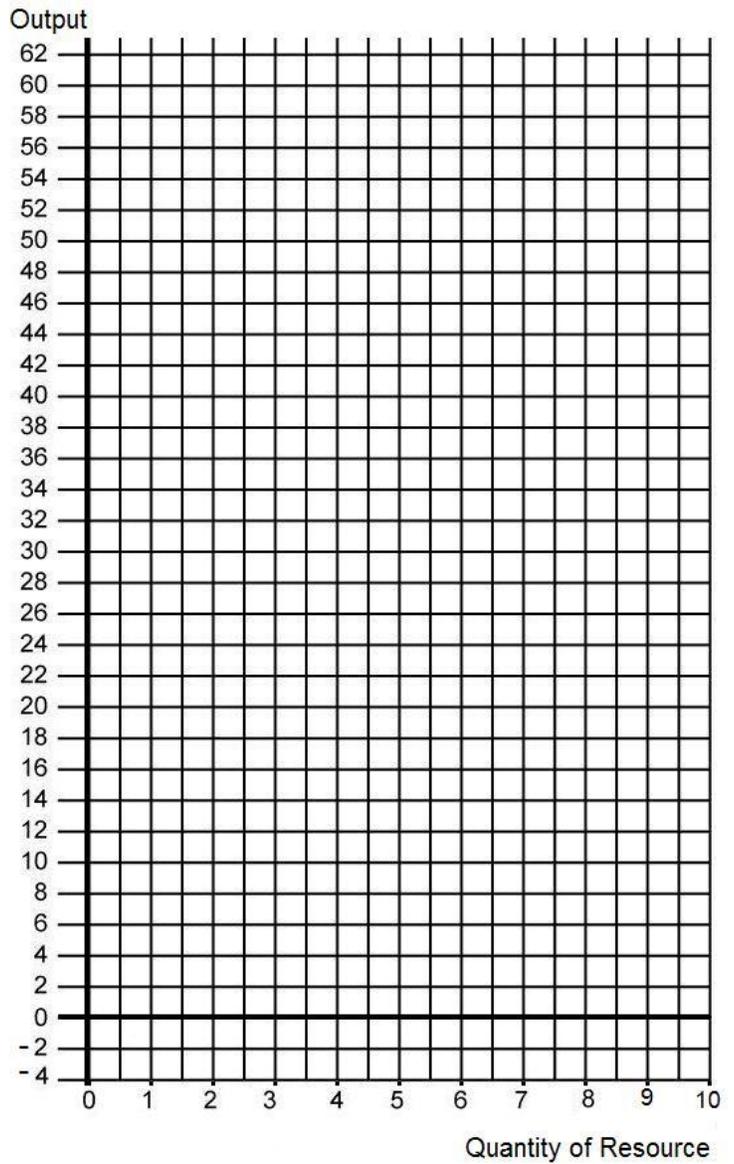
# The Production Function and the Law of Diminishing Marginal Returns

7a

1. Complete the following table

Quantity of Resource	TP	MP	AP
0	0		
1	6		
2	14		
3	26		
4	37		
5	46		
6	52		
7	57		
8	60		
9	61		
10	60		

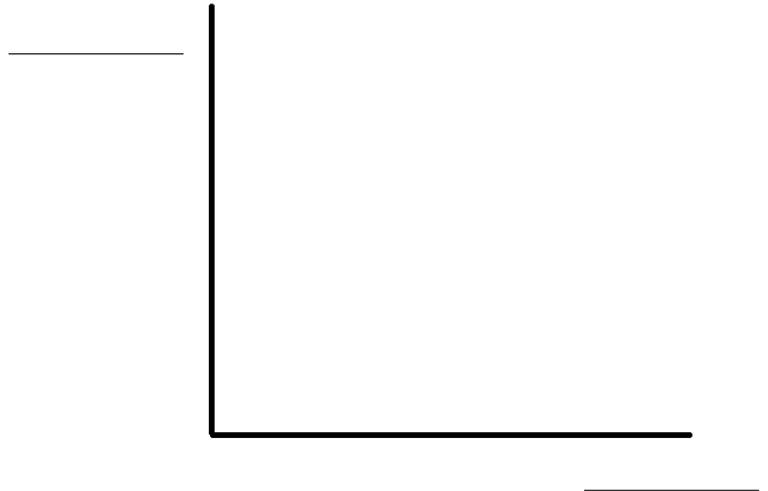
2. Plot: TP, MP, AP  
(Note: plot MP at the midpoints)



**WORKSHEET – Production Function**

**7a**

- 1. Sketch and label graphs of TP, AP, and MP on the graph at the right.**



- 2. Explain the shape of the TP and MP curves:**
- a. Why does TP at first increase at an increasing rate? What is happening to MP then?**
  
  - b. Why does TP later increase at a decreasing rate? What is happening to MP then?**
  
  - c. Why does TP begin to decrease at an increasing rate? What is happening to MP then?**

- 3. Discuss the relationship between the MP and the AP curves.**

- 4. What is the formula to calculate AP? MP?**

**AP =**

**MP =**

5. Why is this statement wrong: “Of course, there are diminishing marginal returns from adding more workers to a fixed quantity of plant and equipment because additional workers are not as good as initial workers.” ?

6. What is the law of diminishing returns? Give a descriptive example.

7. The table below shows the total production of a firm as the quantity of labor employed increases. The quantities of all other resources employed are constant. Compute the marginal and average products and enter them in the table.

Inputs of labor	Total product	Marginal product of labor	Average product of labor
0	0	—	—
1	40	_____	_____
2	100	_____	_____
3	165	_____	_____
4	200	_____	_____
5	225	_____	_____
6	240	_____	_____
7	245	_____	_____
8	240	_____	_____

a. At what levels are there increasing returns to labor?

b. At what levels are there decreasing returns to labor?

c. Describe the relationship between the total product and marginal product.

d. Describe the relationship between marginal and average product.

e. After completing your study of short run costs: At what input-output level will average variable cost begin to rise? Explain.

**Costs of Production – Quick Quiz**  
**PRODUCTION FUNCTION**

7a

**1. Accounting profits are typically:**

1. greater than economic profits because the former do not take explicit costs into account.
2. equal to economic profits because accounting costs include all opportunity costs.
3. smaller than economic profits because the former do not take implicit costs into account.
4. greater than economic profits because the former do not take implicit costs into account.

**2. Suppose that a business incurred implicit costs of \$200,000 and explicit costs of \$1 million in a specific year. If the firm sold 4,000 units of its output at \$300 per unit, its accounting profits were:**

1. \$100,000 and its economic profits were zero.
2. \$200,000 and its economic profits were zero.
3. \$100,000 and its economic profits were \$100,000.
4. zero and its economic loss was \$200,000.

**3. The basic characteristic of the short run is that:**

1. barriers to entry prevent new firms from entering the industry.
2. the firm does not have sufficient time to change the size of its plant.
3. the firm does not have sufficient time to cut its rate of output to zero.
4. a firm does not have sufficient time to change the amounts of any of the resources it employs.

**4. Which of the following represents a long-run adjustment?**

1. a farmer uses an extra dose of fertilizer on his corn crop
2. unable to meet foreign competition, a U.S. watch manufacturer sells one of its branch plants
3. a steel manufacturer cuts back on its purchases of coke and iron ore
4. a supermarket hires four additional clerks

**5. If in the short run a firm's total product is increasing, then its:**

1. marginal product must also be increasing.
2. marginal product must be decreasing.
3. marginal product could be either increasing or decreasing.
4. average product must also be increasing.

**6. The law of diminishing returns describes the:**

1. relationship between total costs and total revenues.
2. profit-maximizing position of a firm.
3. relationship between resource inputs and product outputs in the short run.
4. relationship between resource inputs and product outputs in the long run.

**Answer the next question(s) on the basis of the following output data for a firm. Assume that the amounts of all non-labor resources are fixed.**

<b>Number of Workers</b>	<b>Units of Output</b>
<b>0</b>	<b>0</b>
<b>1</b>	<b>40</b>
<b>2</b>	<b>90</b>
<b>3</b>	<b>126</b>
<b>4</b>	<b>150</b>
<b>5</b>	<b>165</b>
<b>6</b>	<b>180</b>

**7. Refer to the above data. Diminishing marginal returns become evident with the addition of the:**

1. sixth worker.
2. fourth worker.
3. third worker.
4. second worker.

**8. When total product is increasing at a decreasing rate, marginal product is:**

1. positive and increasing.
2. positive and decreasing.
3. constant.
4. negative.

**Short-Run Cost Schedules and Curves**

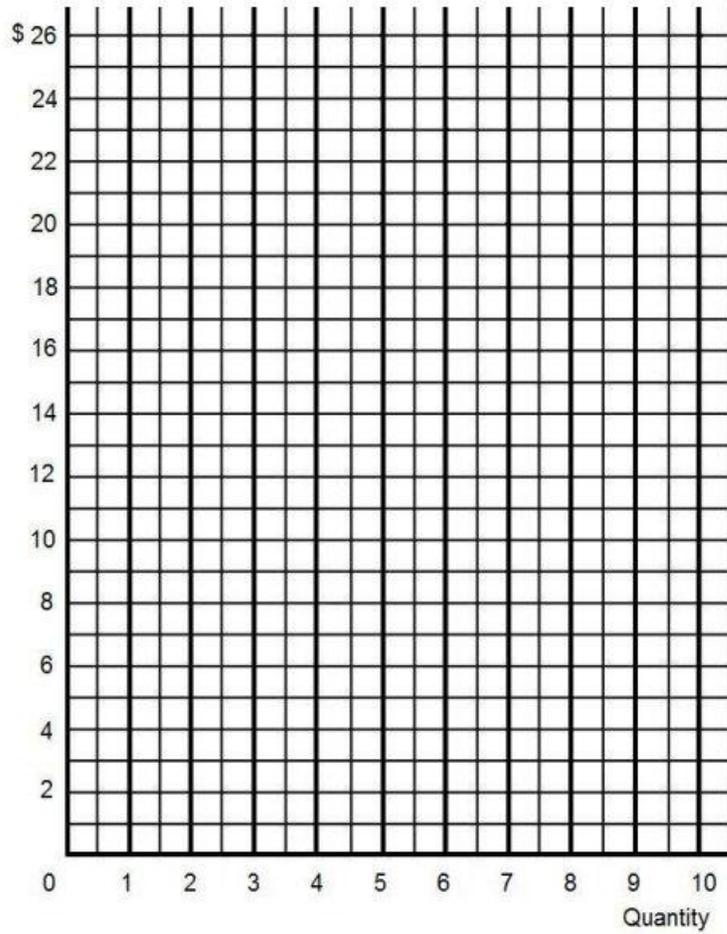
**7b**

<b>Q</b>	<b>TFC</b>	<b>TVC</b>	<b>TC</b>	<b>AFC</b>	<b>AVC</b>	<b>ATC</b>	<b>MC</b>
<b>0</b>	<b>\$ 25</b>	<b>\$ 0</b>	<b>\$</b>	<b>\$ --</b>	<b>\$ --</b>	<b>\$ --</b>	<b>\$ --</b>
<b>1</b>		<b>10</b>					
<b>2</b>		<b>16</b>					
<b>3</b>		<b>20</b>					
<b>4</b>		<b>22</b>					
<b>5</b>		<b>24</b>					
<b>6</b>		<b>27</b>					
<b>7</b>		<b>32</b>					
<b>8</b>		<b>40</b>					
<b>9</b>		<b>54</b>					
<b>10</b>		<b>75</b>					

1. Complete the table above
2. On the first graph on the next page plot: ATC, AVC, and MC (remember to plot MC at the midpoints)
3. On the second graph on the next page plot: TC, TVC, and TFC

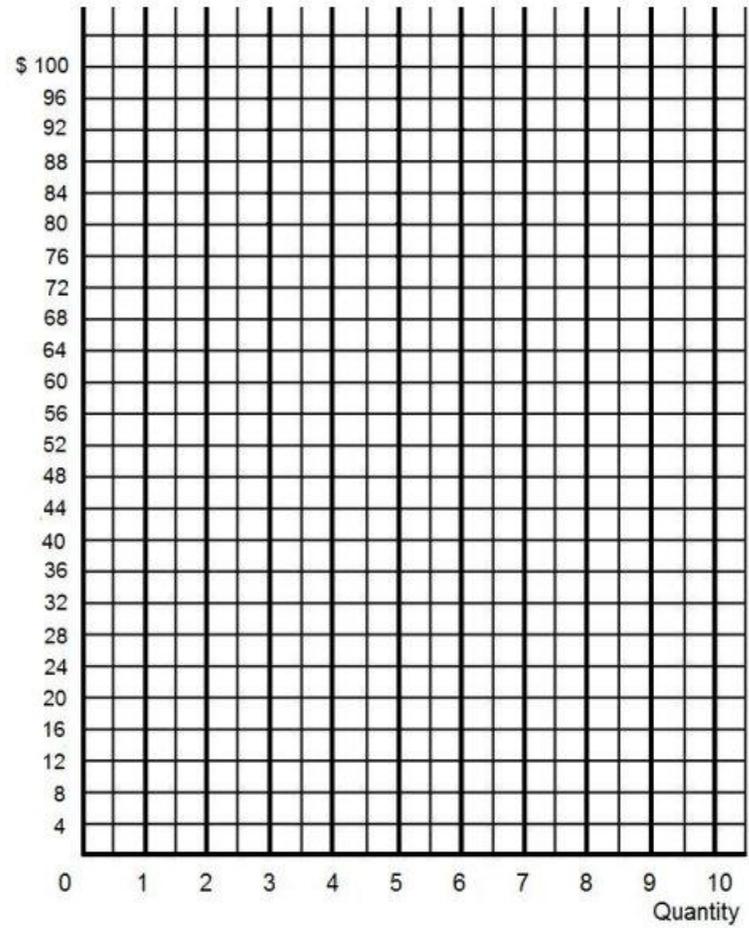
7b

Costs,  
Revenue



Plot: ATC, AVC, and MC

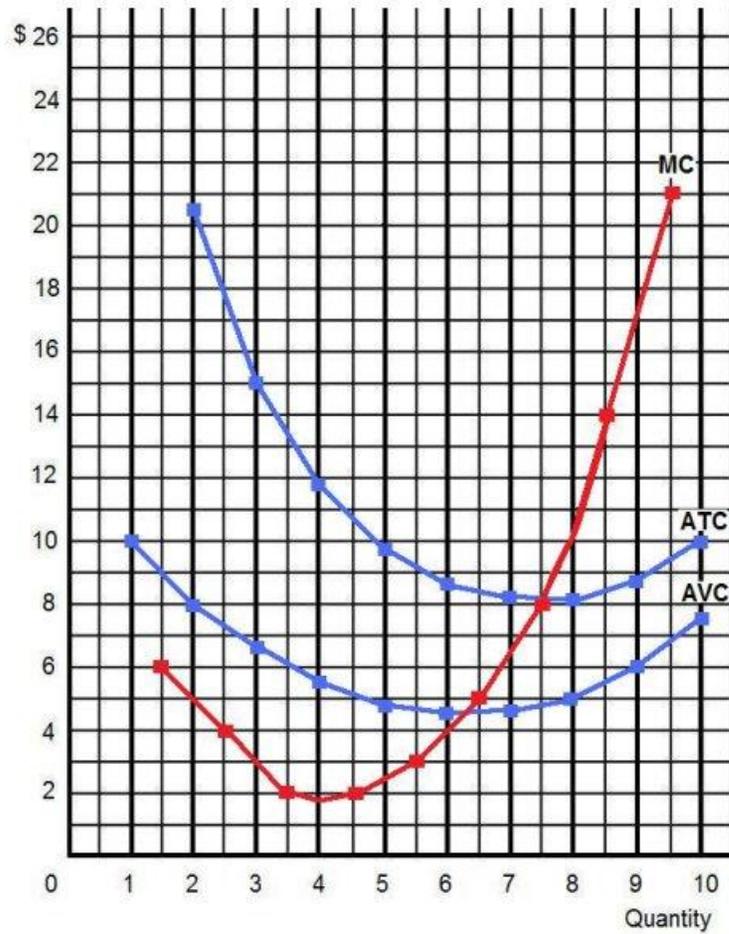
Costs,  
Revenue



Plot: TC, TVC, and TFC

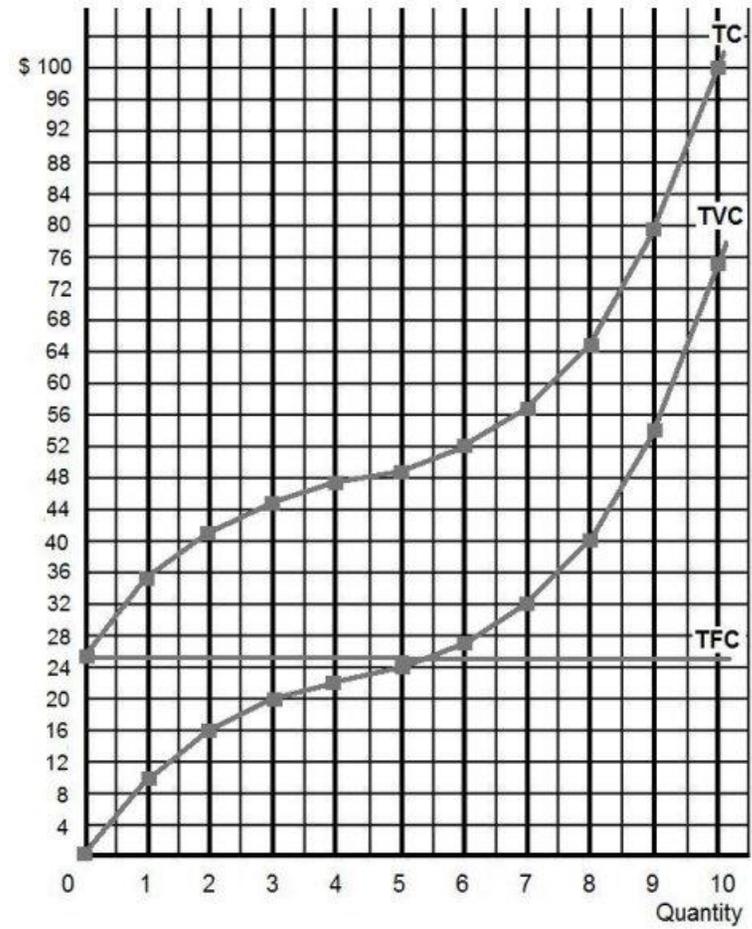
7b

Costs,  
Revenue



Plot: ATC, AVC, and MC

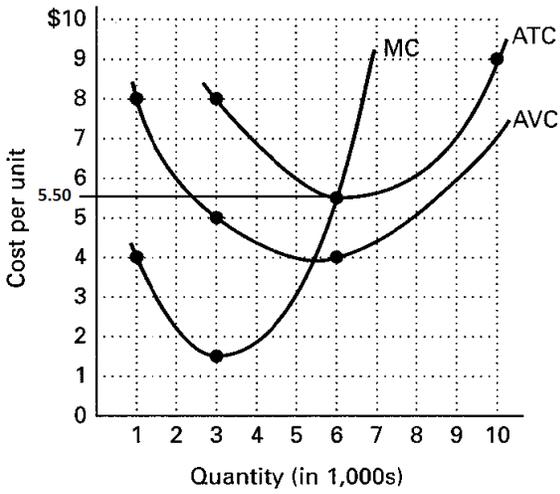
Costs,  
Revenue



Plot: TC, TVC, and TFC

**REVIEW – Short Run Costs**

**7b**



(a) How can you tell if these cost curves are for the short run or the long run?

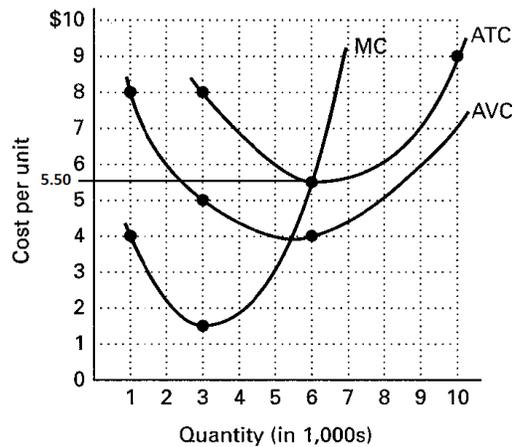
(b) According to the graph, what is:

(1) AVC at 6,000 units of output?

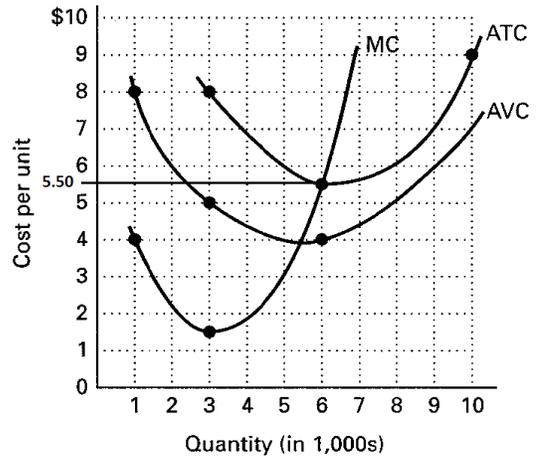
(2) ATC at 6,000 units of output?

(3) AFC at 6,000 units of output?

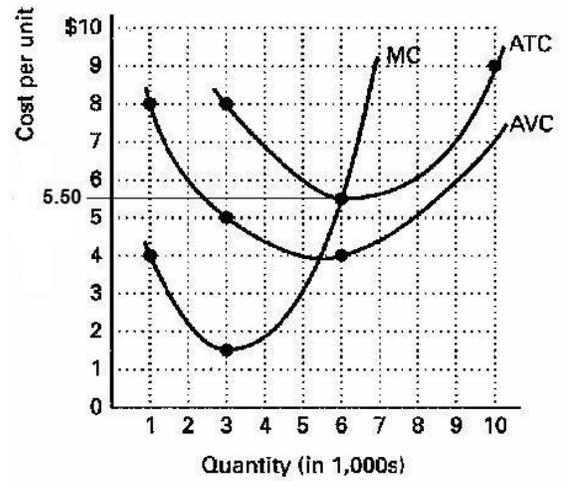
(4) TVC at 6,000 units of output? Show TVC on graph below by shading it in.



(5) TFC at all levels of output? Show TFC on graph below by shading it in.



(6) TC at 6,000 units of output? Show TC on graph below by shading it in.



(7) When do diminishing returns set in?

**WORKSHEET – Short Run Costs**

**7b**

1. Indicate whether the inputs below are variable (V) or fixed (F) in the short run.

Input	Output
_____ Meat	in hamburgers.
_____ Fire insurance	in dry cleaning.
_____ Tires	in automobiles.
_____ Property tax	in textile production.
_____ Gasoline	in trucking services.
_____ Depreciation	in aircraft production.

2. What is the difference between the short run and the long run?

3. You are given the following short-run information for an individual firm. Labor (L) is the only variable input. The price of labor is \$200/week. Fixed costs are \$100/week.

- Complete the rest of the table.
- Describe the relationship between the MP and MC.
- At which output level does the law of diminishing returns set in?

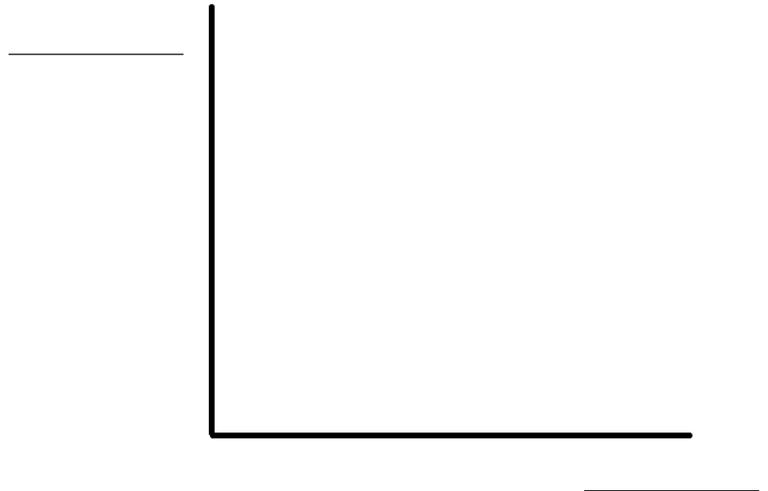
Labor <i>L</i>	Total product <i>Q</i>	MP	TVC	TFC	TC	MC
0	0	_____	\$ _____	\$ _____	\$ _____	
1	20	_____	_____	_____	_____	\$ _____
2	55	_____	_____	_____	_____	_____
3	100	_____	_____	_____	_____	_____
4	150	_____	_____	_____	_____	_____
5	200	_____	_____	_____	_____	_____
6	230	_____	_____	_____	_____	_____
7	250	_____	_____	_____	_____	_____
8	263	_____	_____	_____	_____	_____
9	270	_____	_____	_____	_____	_____
10	275	_____	_____	_____	_____	_____
11	278	_____	_____	_____	_____	_____
12	280	_____	_____	_____	_____	_____

4. Why does the short-run marginal-cost curve eventually increase for the typical firm?

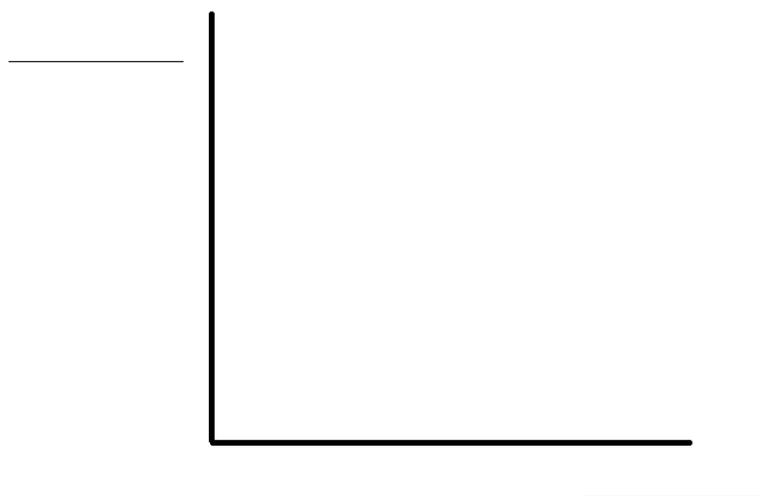
5. Complete the following short-run cost table using the information provided.

Q	TC	TFC	TVC	AVC	ATC	MC
0	\$ 4	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
1	7	_____	_____	_____	_____	_____
2	9	_____	_____	_____	_____	_____
3	10	_____	_____	_____	_____	_____
4	11	_____	_____	_____	_____	_____
5	13	_____	_____	_____	_____	_____
6	17	_____	_____	_____	_____	_____
7	22	_____	_____	_____	_____	_____

6. Sketch and label graphs of TC, TVC, and TFC on the graph at the right.



7. Sketch and label graphs of ATC, AVC, and MC on the graph at the right.



**Costs of Production – Quick Quiz**  
**SHORT RUN COSTS**

7b

**1. If you owned a small farm, which of the following would be a fixed cost?**

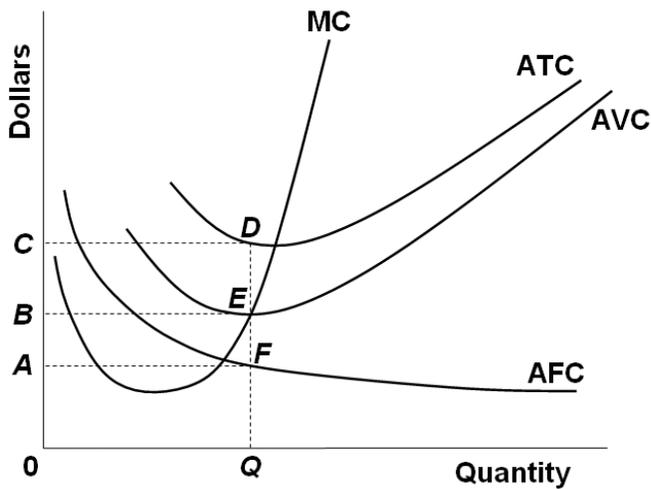
1. harvest labor
2. hail insurance
3. fertilizer
4. seed

**2. If you operated a small bakery, which of the following would be a variable cost in the short run?**

1. baking ovens
2. interest on business loans
3. annual lease payment for use of the building
4. baking supplies (flour, salt, etc.)

**3. Which of the following is *correct* as it relates to cost curves?**

1. Average variable cost intersects marginal cost at the latter's minimum point.
2. Marginal cost intersects average total cost at the latter's minimum point.
3. Average fixed cost intersects marginal cost at the latter's minimum point.
4. Marginal cost intersects average fixed cost at the latter's minimum point.



**4. Refer to the above diagram. At output level  $Q$  total variable cost is:**

1.  $OBEQ$ .
2.  $BCDE$ .
3.  $0CDQ$ .
4.  $0AFQ$ .

**5. Refer to the above diagram. At output level  $Q$  total fixed cost is:**

1.  $OBEQ$ .
2.  $BCDE$ .
3.  $0BEQ - 0AFQ$ .
4.  $0CDQ$ .

**6. Refer to the above diagram. At output level  $Q$  total cost is:**

1.  $OBEQ$ .
2.  $BCDE$ .
3.  $0BEQ$  plus  $BCDE$ .
4.  $0AFQ$  plus  $BCDE$ .

**7. Refer to the above diagram. At output level  $Q$  average fixed cost:**

1. is equal to  $EF$ .
2. is equal to  $QE$ .
3. is measured by both  $QF$  and  $ED$ .
4. cannot be determined from the information given.

**8. Refer to the above diagram. At output level  $Q$ :**

1. marginal product is falling.
2. marginal product is rising.
3. marginal product is negative.
4. one cannot determine whether marginal product is falling or rising.

Answer the next question(s) on the basis of the following cost data:

<u>Output</u>	<u>Total Cost</u>
0	\$24
1	33
2	41
3	48
4	54
5	61
6	69

**9. Refer to the above data. The total variable cost of producing 5 units is:**

1. \$61.
2. \$48.
3. \$37.
4. \$24.

**10. Refer to the above data. The average total cost of producing 3 units of output is:**

1. \$14.
2. \$12.
3. \$13.50.
4. \$16.

**11. Refer to the above data. The average fixed cost of producing 3 units of output is:**

1. \$8.
2. \$7.40.
3. \$5.50.
4. \$6.

**12. Refer to the above data. The marginal cost of producing the sixth unit of output is:**

1. \$24.
2. \$12.
3. \$16.
4. \$8.

**WORKSHEET– Long Run Costs**

7c

1. The following are three short-run average total cost schedules for the only three possible plant sizes, 1, 2, and 3. Find the long-run average cost schedule and show the result in the second table.

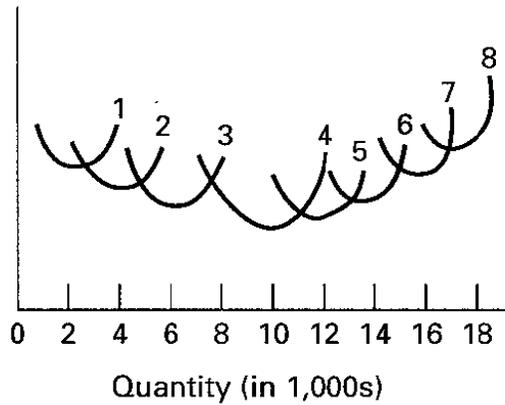
Size 1		Size 2		Size 3		Long Run	
Q	ATC	Q	ATC	Q	ATC	Q	AC
10	\$1.00	20	\$.95	40	\$1.00	10	\$_____
20	.90	30	.80	50	.87	_____	_____
30	.85	40	.76	60	.84	_____	_____
40	.88	50	.79	70	.80	_____	_____
50	.93	60	.83	80	.95	_____	_____
60	1.05	70	.90	90	1.05	_____	_____
						90	_____

2. What factors explain economies of scale?
3. How can diseconomies of scale occur at larger capacities?
4. The values for the long-run ATC curves of three different firms are listed in the table below.

Quantity	ATC 1	ATC 2	ATC 3
5	10	7	12
10	8	6	9
15	7	5	7
20	6	6	6
25	6	7	5
30	6	9	4
35	7	13	6
40	8	17	9

- (a) Which firm faces the lowest minimum ATC?
- (b) Which firm has the greatest minimum efficient scale?
- (c) Which firm has the smallest economies of scale?

5. Consider the diagram below. Curves 1–8 are the short-run curves which occur with different plant sizes. Answer the next two questions.



- (a) On the graph show the range of outputs for:

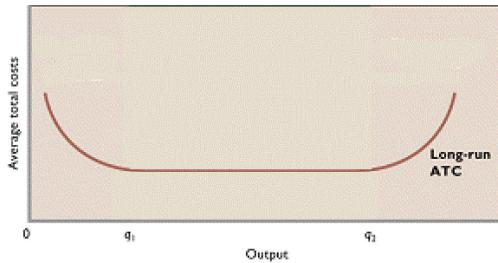
- (1) economies of scale;
- (2) diseconomies of scale;
- (3) Indicate minimum efficient scale.

- (b) In the long run, what plant size should the firm build if it wants to produce:

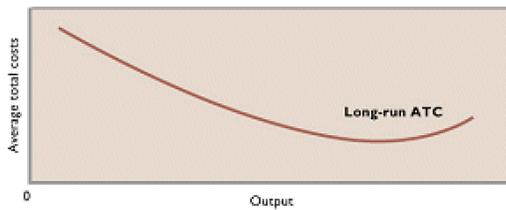
- (1) 6000 units;
- (2) 14,000 units?

6. Which long run ATC graph below is associated with each of the following? Put the letter of the graph in the space provided.

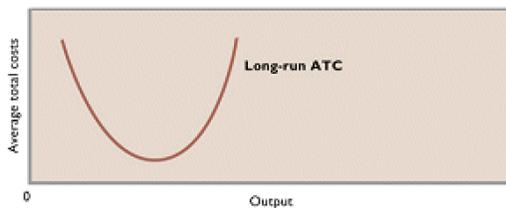
**A.**



**B.**



**C.**



- a. \_\_\_\_\_ why there are two plants run by one firm that produce large commercial aircraft
- b. \_\_\_\_\_ why there are thousands of plants run by hundreds of firms that produce ready-mix concrete
- c. \_\_\_\_\_ extended range of constant returns to scale
- d. \_\_\_\_\_ economies of scale continue over a wide range of outputs
- e. \_\_\_\_\_ economies of scale are few and diseconomies come into play quickly
- f. \_\_\_\_\_ the minimum efficient size occurs at a low level of output (two answers)
- g. \_\_\_\_\_ large number of relatively small producers
- h. \_\_\_\_\_ many retail trades and some types of farming fall into this category
- i. \_\_\_\_\_ populated by firms of quite different sizes, some big, some small
- j. \_\_\_\_\_ the apparel, food processing, furniture, wood products, snowboard, banking, and small-appliance industries are examples
- k. \_\_\_\_\_ certain kinds of light manufacturing such as the baking, clothing, and shoe industries are examples
- l. \_\_\_\_\_ automobile, aluminum, steel, and other heavy industries, computer microchips, operating system software, and Internet service provision are examples

**Costs of Production – Quick Quiz**  
**LONG RUN COSTS**

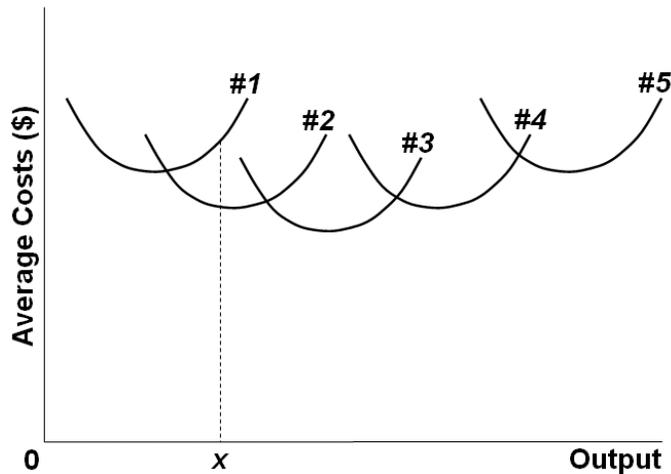
7c

**1. Economies and diseconomies of scale explain:**

1. the profit-maximizing level of production.
2. why the firm's long-run average total cost curve is U-shaped.
3. why the firm's short-run marginal cost curve cuts the short-run average variable cost curve at its minimum point.
4. the distinction between fixed and variable costs.

**2. In the long run:**

1. all costs are variable costs.
2. all costs are fixed costs.
3. variable costs equal fixed costs.
4. fixed costs are greater than variable costs.



**3. The above diagram shows the short-run average total cost curves for five different plant sizes of a firm. The shape of each individual curve reflects:**

1. increasing returns, followed by diminishing returns.
2. economies of scale, followed by diseconomies of scale.
3. constant costs.
4. increasing costs, followed by decreasing costs.

**4. As the firm in the above diagram expands from plant size #1 to plant size #3, it experiences:**

1. diminishing returns.
2. economies of scale.
3. diseconomies of scale.
4. constant costs.

Use the following data to answer the next question(s). The letters A, B, and C designate three successively larger plant sizes.

Output	ATC-A	ATC-B	ATC-C
10	\$6	\$13	\$44
20	5	9	35
30	4	6	27
40	5	4	20
50	7	3	14
60	10	4	11
70	14	5	8
80	19	7	6
90	25	10	5
100	32	16	7

**5. Refer to the above data. At what level of output is minimum efficient scale realized?**

1. 30
2. 40
3. 50
4. 60

**6. Economies of scale are indicated by:**

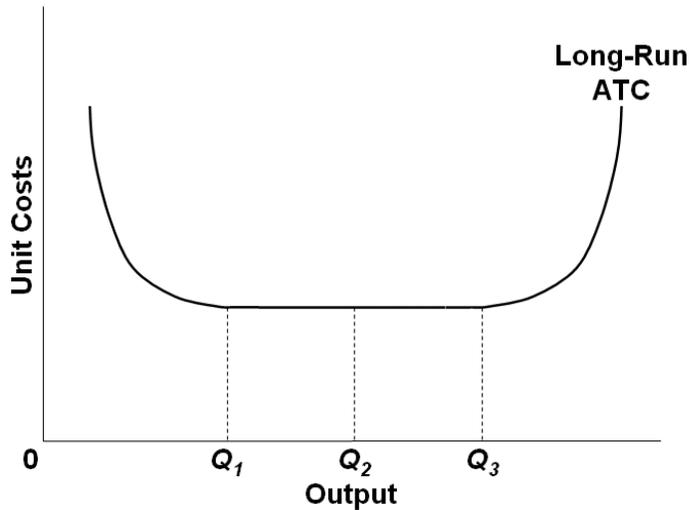
1. the rising segment of the average variable cost curve.
2. the declining segment of the long-run average total cost curve.
3. the difference between total revenue and total cost.
4. a rising marginal cost curve.

**7. If an industry's long-run average total cost curve has an extended range of constant returns to scale, this implies that:**

1. technology precludes both economies and diseconomies of scale.
2. the industry will be a natural monopoly.
3. both relatively small and relatively large firms can be viable in the industry.
4. the industry will be comprised of a very large number of small firms.

**8. Diseconomies of scale arise primarily because:**

1. the short-run average total cost curve rises when marginal product is increasing.
2. of the difficulties involved in managing and coordinating a large business enterprise.
3. firms must be large both absolutely and relative to the market to employ the most efficient productive techniques available.
4. beyond some point marginal product declines as additional units of a variable resource (labor) are added to a fixed resource (capital).



**9. Refer to the above diagram. Minimum efficient scale:**

1. occurs at some output greater than  $Q_3$ .
2. is achieved at  $Q_1$ .
3. is achieved at  $Q_3$ .
4. cannot be identified in this diagram.

**10. Suppose a firm is in a range of production where it is experiencing economies of scale.**

**Knowing this, we can predict that:**

1. the long-run average total cost curve is upsloping.
2. a 10 percent increase in all inputs will increase output by less than 10 percent.
3. a 10 percent increase in all inputs will increase output by more than 10 percent.
4. the firm is encountering problems of managerial bureaucracy because of its size.