



BUSS 230: Managerial Economics

Fall 2011-2012

Assignment 1

Sections 1 to 6

Due Date: Wednesday, November 2, 2011 (in class).

Instructions: The assignment contains 11 Questions (and 7 sheets). Complete all the questions. The answers should be submitted individually. You are allowed one week to complete this assignment. **Assignments are due back in class.**

Question 1

Moving along a demand curve, quantity demanded decreases 8 percent when price increases 10 percent.

- The price elasticity of demand is calculated to be _____
- Given the price elasticity calculated in part (a), demand is _____ (elastic, inelastic, unitary elastic) along this portion of the demand curve.
- For this interval of demand, the percentage change in quantity in absolute value is _____ (greater than, less than, equal to) the percentage change in price in absolute value.

Question 2

Fill in the blanks:

- When demand is elastic, an increase in price causes quantity demanded to _____ and total revenue to _____
- When demand is inelastic, a decrease in price causes quantity demanded to _____ and total revenue to _____
- When demand is unitary elastic, an increase in price causes quantity demanded to _____ and total revenue to _____
- If price falls and total revenue falls, demand must be _____
- If price rises and total revenue stays the same, demand must be _____
- If price rises and total revenue rises, demand must be _____

Question 3

Consider the linear demand function $Q = 20 - 0.5P$

- Write an expression for the inverse demand function.
- Write an expression for the total revenue function.
- Write an expression for the marginal revenue function.
- Find the quantity, Q^* , at which total revenue is maximized.
- Is revenue maximization (in part (d)) an example of a constrained optimization problem?

Question 4

The Johnson Robot Company's marketing manager estimates that the demand curve for the company's robots in 2008 is:

$$P = 3000 - 40Q$$

Where P is the price of a robot and Q is the number sold per month.

- Derive the marginal revenue curve for the firm.
- At what *range of prices* is the demand for the firm's product price elastic? Justify your answer carefully.
- If the firm wants to maximize its total revenue, what price should it charge?

Question 5

Two goods have a cross price elasticity of +1.2

- Would you describe these goods as substitutes or complements?
- If the price of one of the goods increases by 5 percent, what will happen to the demand for the other product, holding constant the effects of all other factors?

Question 6

The demand for renting motorboats in a resort town has been estimated to be $Q_d = 5,000 - 50P$, where Q_d is the quantity of boats demanded (boat-hours) and P is the average price per hour to rent a motorboat. If this relationship holds true in the future:

- How many boat-hours will be demanded at rental price of \$10, \$20, and \$30 per hour?
- What is the *arc* price elasticity between \$10 and \$20? Between \$20 and \$30?
- What is the point price elasticity at \$10, \$20, and \$30?

Question 7

Given the following demand schedule:

Price P (\$)	Quantity Q_d (pounds of steak)	Arc Elasticity E_d	Total Revenue (\$)	Marginal Revenue (\$/Unit)
\$12	30	NA		NA
11	40			
10	50			
9	60			
8	70			
7	80			
6	90			
5	100			
4	110			

Compute the associated arc elasticity, total revenue and marginal revenue values.

Question 8

The general linear demand for good X is estimated to be

$$Q = 250,000 - 500P - 1.50M - 240P_R$$

Where P is the price of good X, M is average income of consumers who buy good X, and P_R is the price of related good R. The values of P, M, and P_R are expected to be \$200, \$60,000 and \$100, respectively. Use these values at this point on demand to make the following computations.

- Compute the quantity of good X demanded for the given values of P, M, and P_R .
- Calculate the price elasticity of demand E_p . At this point on the demand for X, is demand elastic, inelastic or unitary elastic? How would increasing the price of X affect total revenue? Explain.
- Calculate the income elasticity of demand E_M . Is good X normal or inferior? Explain how a 4 percent increase in income would affect demand for X, all other factors affecting the demand for X remaining the same.
- Calculate the cross-price elasticity E_{XR} . Are the goods X and R substitutes or complements? Explain how a 5 percent decrease in the price of related good R would affect demand for X, all other factors affecting the demand for X remaining the same.

Question 9

The estimated market demand for good X is:

$$\hat{Q} = 70 - 3.5P - 0.6M + 4P_Z$$

Where \hat{Q} is the estimated number of units of good X demanded, P is the price of the good, M is income, and P_Z is the price of the related good Z. (all parameter estimates are statistically significant at the 1% level.)

- Is X a normal or an inferior good? Explain.
- Are X and Z substitutes or complements? Explain.

- c. At $P=10$, $M=30$, and $P_z=6$, compute estimates for the price (E_p), income (E_M) and cross-price elasticities (E_{xz}).

Question 10

A linear market demand function of the form

$$Q = a + bP + cM + dP_R$$

Was estimated using regression analysis. The results of this estimation are as follows:

DEPENDENT VARIABLE: Q		R-SQUARE	F-RATIO	P-VALUE ON F
OBSERVATIONS: 24		0.8118	28.75	0.0001
VARIABLE	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	P-VALUE
INTERCEPT	68.38	12.65		0.0001
P	-6.50	3.15		0.0492
M	0.13926	0.0131		0.0001
PR	-10.77	2.45		0.0002

- Is the sign of \hat{b} as would be predicted theoretically? Why?
- What does the sign of \hat{c} imply about the good?
- What does the sign of \hat{d} imply about the relation between the commodity and the related good R?
- Are the parameter estimates \hat{a} , \hat{b} , \hat{c} , and \hat{d} statistically significant at the 5% level of significance? Use both t-statistics and p-values to test the hypotheses.
- Using the values $P = 225$, $M = 24,000$ and $P_R = 60$, calculate the estimates of:

1. The price elasticity of demand (E_p).
2. The income elasticity of demand (E_M).
3. The cross price elasticity (E_{XR}).

Question 11

Wilpen Company, a price-setting firm, produces nearly 80 percent of all tennis balls purchased in the United States. Wilpen estimates the U.S. demand for its tennis balls by using the following linear specification:

$$Q = a + bP + cM + dP_R$$

Where Q is the number of cans of tennis balls sold quarterly, P is the wholesale price Wilpen charges for a can of tennis balls, M is the consumers' average household income, and P_R is the average price of tennis rackets. The regression results are as follows:

DEPENDENT VARIABLE: Q		R-SQUARE	F-RATIO	P-VALUE ON F
OBSERVATIONS: 20		0.8435	28.75	0.001
VARIABLE	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	P-VALUE
INTERCEPT	425120.0	220300.0		0.0716
P	-37260.6	12587		0.0093
M	1.49	0.3651		0.0009
PR	-1456.0	460.75		0.0060

- a. Discuss the statistical significance of the parameter estimates \hat{a} , \hat{b} , \hat{c} , and \hat{d} using both t-statistics and p-values. Are the signs of \hat{b} , \hat{c} , and \hat{d} consistent with the theory of demand?

Wilpen plans to charge a wholesale price of \$1.65 per can. The average price of a tennis racket is \$110, and the consumers' average household income is \$24,600.

- b. What is the estimated number of cans of tennis balls demanded?
- c. At the values of P , M and P_R given, what are the estimated values of the price elasticity (E_P), income elasticity (E_M), and the cross price elasticity of demand (E_{XR})?
- d. What will happen, *in percentage terms*, to the number of cans of tennis balls demanded if the price of tennis balls decreases 15 percent?
- e. What will happen, *in percentage terms*, to the number of cans of tennis balls demanded if average household income increases by 20 percent?
- f. What will happen, *in percentage terms*, to the number of cans of tennis balls demanded if the average price of tennis rackets increases by 25 percent?