

Name _____

1. Let x_1 and x_2 be the quantities demanded of each of two goods, and let p_1 and p_2 be the two prices, which are not constant. The relationship between prices and quantities can be represented either by the *inverse demand functions* on the left or by the *demand functions* on the right:

$$\begin{array}{l} p_1 = 50 - .7x_1 - .2x_2 \\ p_2 = 40 - .2x_1 - .4x_2 \end{array} \quad \text{or} \quad \begin{array}{l} x_1 = 50 - 1.67p_1 + .83p_2 \\ x_2 = 75 + .83p_1 - 2.92p_2. \end{array}$$

- a. (3 points) Does the “Law of Demand” hold for goods one and two? Why or why not?
- b. (3 points) Are goods one and two substitutes, complements, or neither? Explain.
- c. (13 points) Suppose a firm’s revenues come from producing both of the goods and selling them according to the relationships given above. Suppose, further, that costs are given by $C(x_1, x_2) = .3x_1^2 + .2x_2^2 + 10$. If the firm maximizes profit, how much of each good will it sell and what price will it charge for each good?
2. Suppose $Q_1 = 5000 - 30P_1 + 20M + 2P_2$, where Q_1 is the quantity demanded of good one, P_1 is the price of good one, M is income, and P_2 is the price of good two. Consider demand when $P_1 = 150$, $M = 100$, and $P_2 = 50$.
- a. (6 points) Which of the following terms apply to demand given these prices and income: inelastic, elastic, inferior, normal, necessity, luxury, substitutes, complements. Explain your answer.
- b. (3 points) Given these prices and income, would an increase in the price of good one increase or decrease total spending on good one? (Use the concept of elasticity to answer this question.)
3. (3 points) If the cross elasticity of demand between shoes and sandals is .35, what percentage change in the price of sandals would it take to increase the amount of shoes demanded by 10%? Would this require an increase or decrease in the price of sandals? Explain.
4. (3 points) Suppose the income elasticity of demand for detergent is .4. If income increased by 10%, would the amount of detergent bought increase by more or less than 10%? Explain.
5. a. (12 points) Starting from indifference curves and budget lines, carefully explain (using words and graphs) how each of the following is derived: (i) the demand curve for good one and (ii) the Engel curve for good one.
- b. (4 points) Is the marginal rate of substitution (MRS) the same for all points on the demand curve? Is MRS the same for all points on the Engel curve? Explain.