

HW #2 Solutions

QUESTIONS FOR REVIEW

7. Are the following statements true or false? Explain your answer.

a. **The elasticity of demand is the same as the slope of the demand curve.**

False. Elasticity of demand is the percentage change in quantity demanded for a given percentage change in the price of the product. The slope of the demand curve is the change in price for a given change in quantity demanded, measured in units of output. Though similar in definition, the units for each measure are different.

b. **The cross price elasticity will always be positive.**

False. The cross price elasticity measures the percentage change in the quantity demanded of one product for a given percentage change in the price of another product. This elasticity will be positive for substitutes (an increase in the price of hot dogs is likely to cause an increase in the quantity demanded of hamburgers) and negative for complements (an increase in the price of hot dogs is likely to cause a decrease in the quantity demanded of hot dog buns).

c. **The supply of apartments is more inelastic in the short run than the long run.**

True. In the short run it is difficult to change the supply of apartments in response to a change in price. Increasing the supply requires constructing new apartment buildings, which can take a year or more. Since apartments are a durable good, in the long run a change in price will induce suppliers to create more apartments (if price increases) or delay construction (if price decreases).

10. In a discussion of tuition rates, a university official argues that the demand for admission is completely price inelastic. As evidence she notes that while the university has doubled its tuition (in real terms) over the past 15 years, neither the number nor quality of students applying has decreased. Would you accept this argument? Explain briefly. (Hint: The official makes an assertion about the demand for admission, but does she actually observe a demand curve? What else could be going on?)

If demand is fixed, the individual firm (a university) may determine the shape of the demand curve it faces by raising the price and observing the change in quantity sold. The university official is not observing the entire demand curve, but rather only the equilibrium price and quantity over the last 15 years. If demand is shifting upward, as supply shifts upward, demand could have any elasticity. (See Figure 2.7, for example.) Demand could be shifting upward because the value of a college education has increased and students are willing to pay a high price for each opening. More market research would be required to support the conclusion that demand is completely price inelastic.

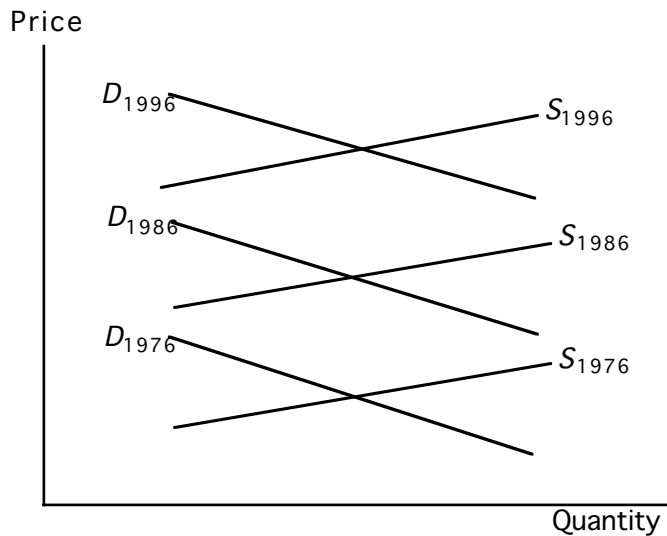


Figure 2.10

11. Suppose the demand curve for a product is given by $Q=10-2P+P_s$, where P is the price of the product and P_s is the price of a substitute good. The price of the substitute good is \$2.00. a. Suppose $P=\$1.00$. What is the price elasticity of demand?

First you need to find the quantity demanded at the price of \$1.00. $Q=10-2(1)+2=10$. Price elasticity of demand = $\frac{P \Delta Q}{Q \Delta P} = \frac{1}{10}(-2) = -\frac{2}{10} = -0.2$.

b. Suppose the price of the good, P , goes to \$2.00. Now what is the price elasticity of demand?

First you need to find the quantity demanded at the price of \$2.00. $Q=10-2(2)+2=8$.

Price elasticity of demand = $\frac{P \Delta Q}{Q \Delta P} = \frac{2}{8}(-2) = -\frac{4}{8} = -0.5$.

EXERCISES

7. In 1998, Americans smoked 470 billion cigarettes, or 23.5 billion packs of cigarettes. The average retail price was \$2 per pack. Statistical studies have shown that the price elasticity of demand is -0.4, and the price elasticity of supply is 0.5. Using this information, derive linear demand and supply curves for the cigarette market.

Let the demand curve be of the general form $Q=a-bP$ and the supply curve be of the general form $Q=c+dP$, where a , b , c , and d are the constants that you have to find from the information given above. To begin, recall the formula for the price elasticity of demand

$$E_p^D = \frac{P \Delta Q}{Q \Delta P}$$

You are given information about the value of the elasticity, P , and Q , which means that you can solve for the slope, which is b in the above formula for the demand curve

$$\begin{aligned} -0.4 &= \frac{2 \Delta Q}{23.5 \Delta P} \\ \frac{\Delta Q}{\Delta P} &= -0.4 \left(\frac{23.5}{2} \right) = -4.7 = -b. \end{aligned}$$

To find the constant a , substitute for Q , P , and b into the above formula so that $23.5=a-4.7*2$ and $a=32.9$. The equation for demand is therefore $Q=32.9-4.7P$. To find the supply curve, recall the formula for the elasticity of supply and follow the same method as above:

$$\begin{aligned} E_p^S &= \frac{P \Delta Q}{Q \Delta P} \\ 0.5 &= \frac{2 \Delta Q}{23.5 \Delta P} \\ \frac{\Delta Q}{\Delta P} &= 0.5 \left(\frac{23.5}{2} \right) = 5.875 = d. \end{aligned}$$

To find the constant c , substitute for Q , P , and d into the above formula so that $23.5=c+5.875*2$ and $c=11.75$. The equation for supply is therefore $Q=11.75+5.875P$.

PART II PRODUCERS, CONSUMERS, AND COMPETITIVE MARKETS CHAPTER 3

QUESTIONS FOR REVIEW

3. Explain why two indifference curves cannot intersect.

The explanation is most easily achieved with the aid of a graph such as Figure 3.3, which shows two indifference curves intersecting at point A . We know from the definition of an indifference curve that a consumer has the same level of utility along any given curve. In this case, the consumer is indifferent between bundles A and B because they both lie on indifference curve U_1 .

Similarly, the consumer is indifferent between bundles A and C because they both lie on indifference curve U_2 . By the transitivity of preferences this consumer should also be indifferent between C and B . However, we see from the graph that C lies above B , so C must be preferred to B . Thus, the fact that indifference curves cannot intersect is proven.

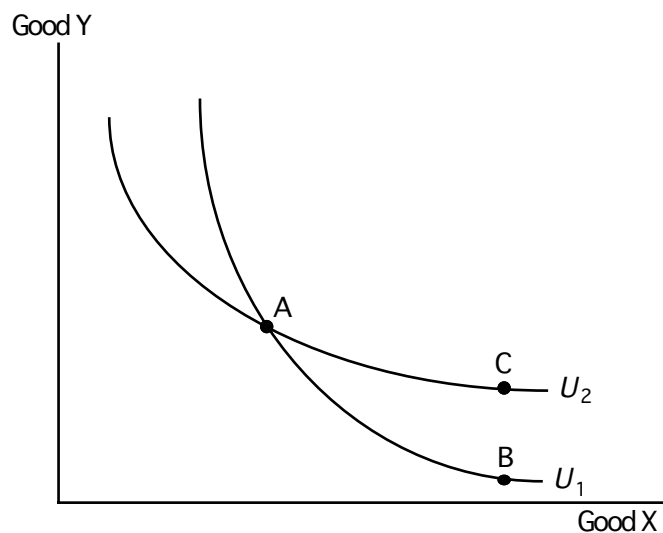


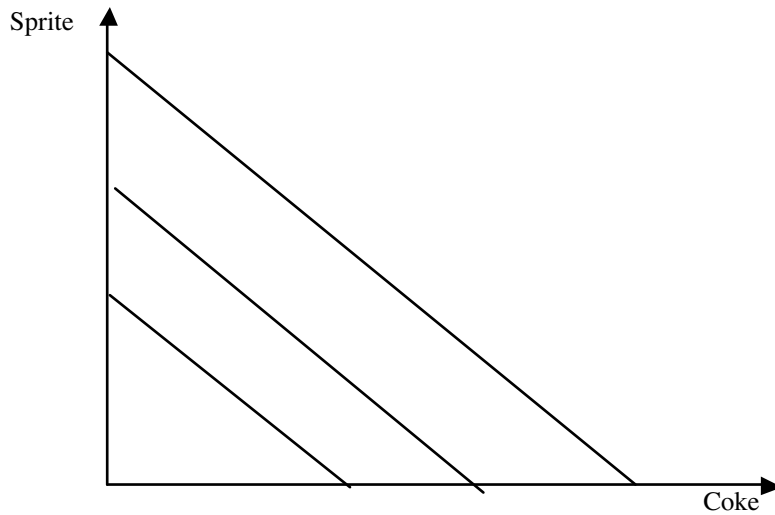
Figure 3.3

4. Jon is always willing to trade one can of coke for one can of sprite, or one can of sprite for one can of coke.**a. What can you say about Jon's marginal rate of substitution?**

Jon's marginal rate of substitution can be defined as the number of cans of coke he would be willing to give up in exchange for a can of sprite. Since he is always willing to trade one for one, his MRS is equal to 1.

b. Draw a set of indifference curves for Jon.

Since Jon is always willing to trade one can of coke for one can of sprite, his indifference curves are linear with a slope of -1 .



- c. **Draw two budget lines with different slopes and illustrate the satisfaction-maximizing choice. What conclusion can you draw?**

Jon's indifference curves are linear with a slope of -1 . Jon's budget line is also linear, and will have a slope that reflects the ratio of the two prices. If Jon's budget line is steeper than his indifference curves then he will choose to consume only the good on the vertical axis. If Jon's budget line is flatter than his indifference curves then he will choose to consume only the good on the horizontal axis. Jon will always choose a corner solution, unless his budget line has the same slope as his indifference curves. In this case any combination of Sprite and Coke that uses up his entire income will maximize his satisfaction.

