

# ANSWERS

## Elasticity Problems

See the *Elasticity* handout for help in working these problems.

1. State the definition of the price elasticity of demand. *IS A MEASURE OF HOW RESPONSIVE QD IS TO A  $\Delta$  IN THE PRICE*
2. What are the three determinants of the price elasticity of demand? *① AVAILABILITY OF RELATED GOODS ② % OF BUDGET DEVOTED TO GOOD ③ TIME*
3. Demonstrate the relationship between elasticity and total revenue. *ELASTIC AS  $\uparrow P \rightarrow \downarrow TR$   
INELASTIC AS  $\uparrow P \rightarrow \uparrow TR$*
4. Total revenue rises while the quantity demanded increases  $\Rightarrow$  in the UPPER (ELASTIC) region of the demand curve.
5. Total revenue rises while the quantity demanded decreases  $\Rightarrow$  in the LOWER (INELASTIC) region of the demand curve.
6. Total revenue falls while the quantity demanded increases  $\Rightarrow$  in the LOWER (INELASTIC) region of the demand curve.
7. Total revenue falls while the quantity demanded decreases  $\Rightarrow$  in the UPPER (ELASTIC) region of the demand curve.
8. Total revenue rises while the price increases  $\Rightarrow$  in the INELASTIC region of the demand curve.
9. Total revenue rises while the price decreases  $\Rightarrow$  in the ELASTIC region of the demand curve.
10. Total revenue falls while the price increases  $\Rightarrow$  in the ELASTIC region of the demand curve.
11. Total revenue falls while the price decreases  $\Rightarrow$  in the INELASTIC region of the demand curve.
12. In the elastic region of the demand curve and the quantity demanded increases  $\Rightarrow$  total revenue INCREASES.
13. In the elastic region of the demand curve and the quantity demanded decreases  $\Rightarrow$  total revenue DECREASES.
14. In the inelastic region of the demand curve and the quantity demanded increases  $\Rightarrow$  total revenue DECREASES.

15. In the inelastic region of the demand curve and the quantity demanded decreases  $\Rightarrow$  total revenue INCREASES.

16. In the elastic region of the demand curve and the price increases  $\Rightarrow$  total revenue DECREASES.

17. In the elastic region of the demand curve and the price decreases  $\Rightarrow$  total revenue INCREASES.

18. In the inelastic region of the demand curve and the price increases  $\Rightarrow$  total revenue INCREASES.

19. In the inelastic region of the demand curve and the price decreases  $\Rightarrow$  total revenue DECREASES.

20. Total revenue rises while in the elastic region of the demand curve  $\Rightarrow$  quantity demanded INCREASES.

21. Total revenue rises while in the inelastic region of the demand curve  $\Rightarrow$  quantity demanded DECREASES.

22. Total revenue falls while in the elastic region of the demand curve  $\Rightarrow$  quantity demanded DECREASES.

23. Total revenue falls while in the inelastic region of the demand curve  $\Rightarrow$  quantity demanded INCREASES.

24. If the elasticity is .5, a 10 % change in price will cause a  $\frac{\% \Delta QD}{\% \Delta P} = \frac{90\% \Delta QD}{.10} = 590$  change in the quantity demanded in the opposite direction.

25. If the elasticity is 3, a -5 % change in price will cause a  $3 = \frac{90\% \Delta QD}{-.05} = 1590$  % change in the quantity demanded in the opposite direction.

$.2 = \frac{.06}{\% \Delta P}$  26. If the elasticity is .2, a 6 % change in the quantity demanded will be caused by a -30 % change in price in the opposite direction.

$7 = \frac{.11}{\% \Delta P}$  27. If the elasticity is 7, a -11 % change in the quantity demanded will be caused by a 1.57 % change in price in the opposite direction.

28. If the quantity demanded changes from 5 to 10 units as the price changes from \$14 to \$9, the elasticity is 1.667 and is called ELASTIC.

$Q_{D1} = 5 \quad P_1 = 14$   
 $Q_{D2} = 10 \quad P_2 = 9$

29. If the quantity demanded changes from 25 to 22 units as the price changes from \$3 to \$10, the elasticity is .1185 and is called INELASTIC.

$Q_{D1} = 25 \quad P_1 = 3$   
 $Q_{D2} = 22 \quad P_2 = 10$

$$\frac{\frac{22-25}{22+25}}{\frac{10-3}{2}} = \frac{-3/47}{7/2} = \frac{-3}{47} \cdot \frac{2}{7} = \frac{-6}{329} \approx -0.0182$$

30. If the quantity demanded changes from 2 to 4 units as the price changes from \$6 to \$3, the elasticity is \_\_\_\_\_ and is called \_\_\_\_\_.

31. State the definition of the income elasticity of demand.

32.  $\epsilon_I > 0 \Rightarrow$  Normal Good.

33.  $\epsilon_I < 0 \Rightarrow$  Inferior Good.

34.  $\epsilon_I > 1 \Rightarrow$  Luxury Good.

35.  $\epsilon_I = 1 \Rightarrow$  Necessity.

38. If the quantity demanded changes from 10 to 15 as income changes from \$20,000 to \$21,000 then the income elasticity is 8.2 and the good is called NORMAL and it is a LUXURY GOOD.

39. If the quantity demanded changes from 40 to 42 as income changes from \$15,000 to \$9,000 then the income elasticity is -0.976 and the good is called INFERIOR.

40. If the quantity demanded changes from 3 to 6 as income changes from \$5,000 to \$12,000 then the income elasticity is .81 and the good is called NORMAL and it is a NORMAL GOOD.

41. If the income elasticity is .1 and income changes by 3%, the quantity demanded changes by 30% and the good is called NORMAL and it is a NORMAL GOOD.

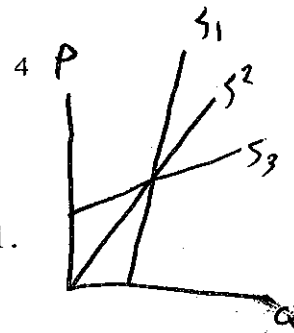
42. If the income elasticity is -2 and income changes by -4%, the quantity demanded changes by .08 and the good is called INFERIOR.

43. If the income elasticity is 3 and the quantity demanded changes by 9%, income changes by .03 and the good is called NORMAL and it is a LUXURY.

44. If the income elasticity is -.7 and the quantity demanded changes by 16%, income changes by -.2286 and the good is called INFERIOR.

45. State the definition of the price elasticity of supply. MEASURES THE RESPONSIVENESS OF QS TO A  $\Delta$  IN THE PRODUCT'S PRICE.

CURVE  $S_2 = \text{UNITARY ELASTIC} = 1$   
 $S_1 = \text{INELASTIC} < 1$   
 $S_3 = \text{ELASTIC} > 1$



46. If the supply curve intercepts the price axis, the elasticity of supply is  $> 1$ .
47. If the supply curve intercepts the quantity axis, the elasticity of supply is  $< 1$ .
48. If the supply curve goes through the origin, the elasticity of supply is  $= 1$ .

49. If the quantity supplied changes from 5 to 10 units as the price changes from \$14 to \$20, the elasticity of supply is 1.89.

50. If the elasticity of supply is 2, a 10% change in price will cause a  $2 \frac{\% \Delta Q}{\% \Delta P} = 20\%$  % change in the quantity supplied in the same direction.

51. If the elasticity of supply is .4, a 6% change in the quantity supplied will be caused by a .15 % change in price in the same direction.

52. State the definition of the cross price elasticity.

53.  $\epsilon_{cp} > 0 \Rightarrow$  Substitutes.

54.  $\epsilon_{cp} < 0 \Rightarrow$  Complements.

55.  $\epsilon_{cp} = 0 \Rightarrow$  Independent goods.

56. If a -8% change in the price of one good causes a 1% change in the quantity demanded of another good, the cross price elasticity is -.125 and the goods are called COMPLIMENTS

57. If a 2% change in the price of one good causes a 3% change in the quantity demanded of another good, the cross price elasticity is 1.5 and the goods are called SUBSTITUTES

58. If the quantity demanded of one good changes from 8 to 10 units as the price of another changes from \$20 to \$25, the cross price elasticity is 1.00 and the goods are called INDIVIDENT.

59. If the quantity demanded of one good changes from 14 to 12 units as the price of another changes from \$13 to \$14, the cross price elasticity is -.8559 and the goods are called COMPLIMENTS

60. Why would a seller not want to operate in the inelastic region of a demand curve?

To  $\uparrow$  TOTAL REVENUE.  $\neq$  MAXIMIZ. POINT OF TR IS @ UNITARY ELASTIC DEMAND

