

Please note: when calculating elasticities, the method used in the answers is slightly different from the midpoint method. Both methods are valid, although they generate different numerical results. We should still use midpoint methods in assignments and exams.

STUDY QUESTIONS ON ELASTICITY

1. What does the elasticity of demand measure?
2. Assume that $P_1 = \$100$ and $Q_1 = 10,000$. Price now increases to $\$115$, and quantity demanded falls to 9,500. Calculate the elasticity of demand.
3. Suppose the elasticity of demand for cigarettes is 1. The government desires to decrease the quantity demanded for cigarettes from its current level of 1,000,000 packs per day to 800,000 packs per day. They will attempt to do this by increasing the tax on cigarettes, thereby causing an increase in price. If the current price is $\$4$ per pack, then price would have to increase to what level to achieve the above drop in quantity demanded?
3. What is the relationship between P and TR when $e < 1$? What is the relationship between P and TR when $e > 1$? What is the relationship between P and TR when $e = 1$?
4. Suppose UCLA is considering raising the tuition rate in order to increase total revenue. Would raising tuition necessarily cause total revenue to rise? Explain your answer. Is it possible that raising tuition could cause total revenue to fall? Explain.
5. What does it mean to say that demand is relatively elastic? ...relatively inelastic? Use a graph to explain.
6. What are some of the determinants of the elasticity of demand? Would the elasticity of a crowd's demand for cold lemonade be affected by the proximity of a drinking fountain? Explain. How does lack of information affect elasticities of demand?
7. Does a society's transportation system in any way affect elasticities of demand?
8. Define and show on graph: perfectly inelastic demand curve and perfectly elastic demand curve.
9. Suppose demand is perfectly elastic at a price of $\$5$. (That is, the horizontal demand curve hits the vertical axis at $\$5$). What would happen to quantity demanded if the price was raised to $\$5.01$?
10. Assume that $P_1 = \$8$ and $Q_1^S = 100,000$. Price now falls to $\$6$. At this lower price, quantity supplied now equals 60,000. What is e_s ?
11. Suppose elasticity of supply equals 0.5. The current price is $\$1,000$ and the current quantity supplied is 1,000,000. If price rises to $\$1,100$, what is the new quantity supplied? Show your answer on a graph as well as providing numerical calculations.
12. What does it mean to say that supply is relatively elastic? ...relatively inelastic? Use a graph to explain.
13. a. Under what circumstances will buyers bear the **entire** burden of a tax? b. Under what circumstances will sellers bear the **entire** burden of a tax? Use supply and demand graphs to show your answer.
14. Suppose harvest-time rains destroy a large quantity of strawberries. Do you think that the total revenue received by strawberry producers will go up or down? Hint: your answer depends upon the elasticity of demand. You should be able to explain why. Use a supply and demand graph to explain your answer.
15. Consider the market for cigarettes in Brazil and the U.S. Suppose the supply curve is the same in each country, but demand for cigarettes is more elastic in the US. The initial price and quantity is the same in each country. Suppose each country imposes an excise tax of $\$1$ /unit on cigarettes. Using a single supply and demand graph, compare the impact on price in each country.

Answers.

1. It measures how sensitive quantity demanded is to changes in price.

2. The elasticity formula is:

$$e = (\text{percentage change in } Q) / (\text{percentage change in } P) = (\Delta Q / Q_1) / (\Delta P / P_1).$$

Step one: Let us first calculate ΔQ (which is read “change in quantity demanded”).

$$\Delta Q = 10,000 - 9,500 = 500.$$

Step two: Next, divide this number by Q_1 (the original quantity demanded). So we have $500 / 10,000 = 0.05$ (or 5%). This tells us that quantity demanded has fallen by 5%.

Step three: Calculate ΔP . Doing so, we get $\Delta P = \$115 - \$100 = \$15$.

Step four: Divide ΔP by P_1 . Doing this, we get $\$15 / \$100 = 0.15$ (or 15%). That is, there has been a 15% increase in price.

Step five: Divide the percentage change in Q by the percentage change in P .

$$e = 0.05 / 0.15 = 1/3.$$

3. Set up the problem as follows:

$$\begin{aligned} e &= (\Delta Q / Q_1) / (\Delta P / P_1) = (200,000 / 1,000,000) / (\Delta P / P_1) = 1 \\ &= (0.20) / (\Delta P / P_1) = 1. \end{aligned}$$

This tells us that $(\Delta P / P_1)$ must be equal to 0.20 also. That is, the price must be increased by 20%. Since the original price of cigarettes was \$4, the new price would have to be \$4.80. (Note: 20% of \$4 is \$0.80).

3b. When $e < 1$ (that is, demand is inelastic), P and TR move in the same direction. In other words, raising P will cause TR to increase and decreasing P will cause TR to fall.

When $e > 1$ (that is, when demand is elastic), P and TR move in opposite directions. In other words, an increase in P will cause TR to fall, and a decrease in P will cause TR to rise.

If $e = 1$ (unit elastic), then a change in P will leave TR unchanged.

4. No. If the demand for schooling at UCLA is elastic ($e > 1$), then raising tuition would cause TR to fall. Explanation: If $e = [(\Delta Q / Q_1) / (\Delta P / P_1)] > 1$, then it follows that the percentage change in Q exceeds the percentage change in P . This means that, say, a 10% increase in P will cause Q to fall by more than 10%. Since $TR = P * Q$, this would mean that TR has fallen. Intuitively, to say that demand is elastic is to say that a relatively small increase in price will lead to a relatively large drop in customers (students).

5. Relatively elastic means the demand curve is relatively flat, and relatively inelastic means the curve is relatively steep. See Graphs.

6. Some of the determinants are (a) the number and knowledge of substitutes, (b) the time interval that a consumer has to adjust to a given price change (short run vs. long run) (c) the definition of a market (how narrow or how broad the definition is), and (d) luxuries vs. necessities. The larger the number of substitutes available, the more elastic demand will be (that is, consumers will be more responsive to a price change). Likewise, the longer the time interval a consumer has to adjust to a price change, the more elastic demand will be. This is due to the fact that the longer the time a consumer has to respond to a given price change, the greater the number of substitutes a consumer will be able to find.

If a market is defined broadly—for example, the market the gasoline—then the fewer close substitutes there are. And so demand would tend to be relatively inelastic. On the other hand, if the market is defined narrowly—for example, the market for Exxon/Mobil gasoline—then the greater the number of close substitutes there are. (Chevron gasoline, Union 76 gasoline, etc. are very close substitutes for ExxonMobil gasoline). In this case, demand is more elastic.

7. The better the transportation system, and thus the cheaper transportation is, the greater the number of substitutes available. If a person is restricted to a limited geographical area, then the number of substitutes would be small in comparison to someone who was not restricted. The greater the number of substitutes available, the more elastic demand will be.

8. See graphs.

9. It would fall to zero. Any price above \$5 would cause quantity demanded to fall to zero if demand was perfectly elastic.

10. The change in quantity supplied = $100,000 - 60,000 = 40,000$. Dividing this by the original quantity supplied gives us $40,000 / 100,000 = 0.40$ (40%). The change in price = $\$8 - \$6 = \$2$.

Dividing this number by the original price gives us $\$2 / \$8 = 0.25$ (25%). Thus:

$$e_s = (0.40) / (0.25) = 1.6.$$

11. Set up as follows: $e_s = (\Delta Q^s / Q_1^s) / (\Delta P / P_1) = (\Delta Q^s / Q_1^s) / (0.10) = 0.50$.

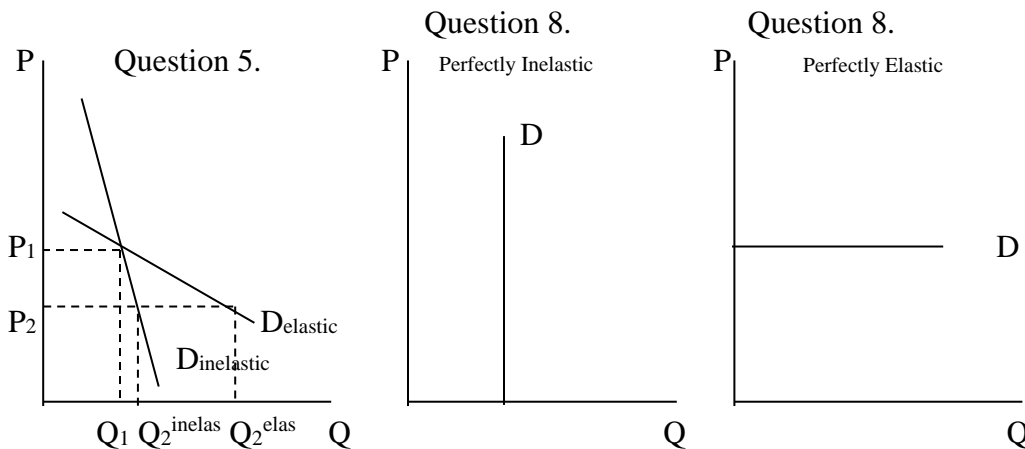
It follows from this equation that $(\Delta Q^s / Q_1^s)$ must be equal to 0.05 (5%). A 5% increase in quantity supplied would make the new quantity supplied equal to 1,050,000.

(Note: 5% of 1,000,000 is 50,000).

12. Relatively elastic means relatively flat, and relatively inelastic means relatively steep. See graphs.

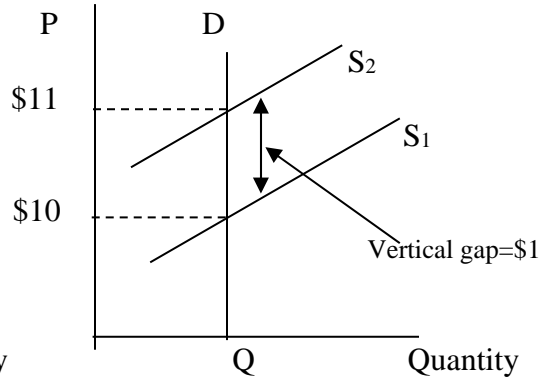
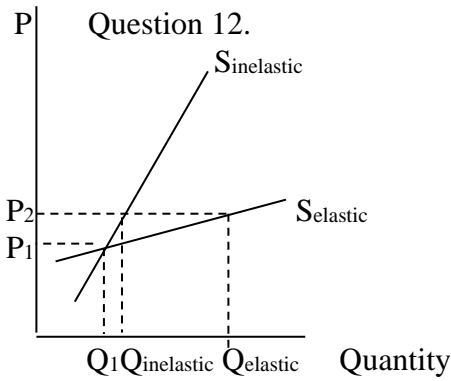
13. See graphs and tables.

14. If the supply of strawberries falls (leftward shift in supply curve), then price will increase. If demand for strawberries is inelastic ($e < 1$) then TR will rise, but if the demand for strawberries is elastic ($e > 1$), then TR will fall. See graphs and the answer to question number (4).



For a given change in price, from P_1 to P_2 , the increase in quantity demanded is greater for elastic curve.

Question 13a.



For this problem it is assumed that an excise tax of \$1/unit is imposed on sellers.

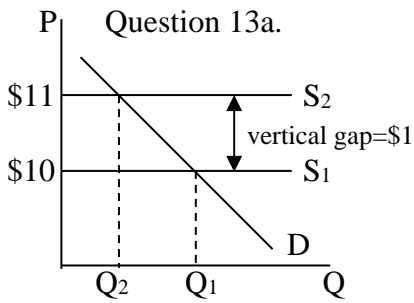


Table for 13a .Buyers bear entire burden

	Before Tax	After Tax
Buyers Pay	\$10	\$11
Sellers receive net price of	\$10	\$11-\$1=\$10

Note: Sellers receive the same price before and after tax, whereas buyers pay a price that is \$1 higher.

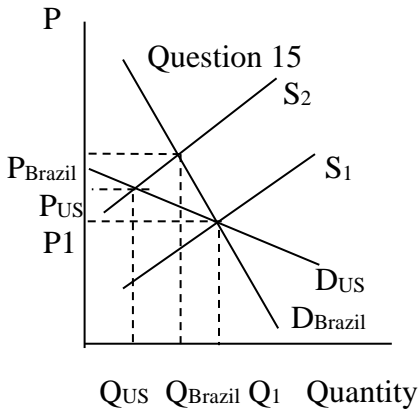
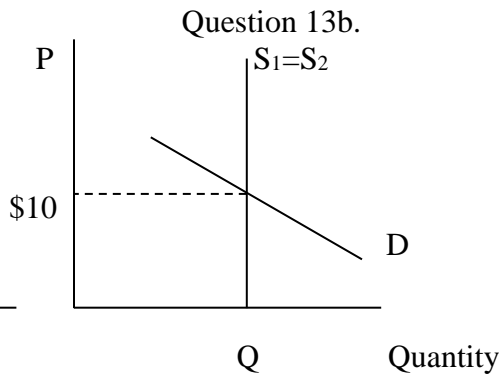
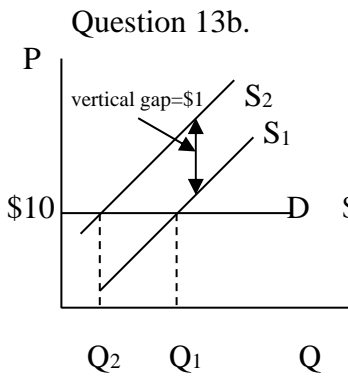


Table for 13b. Sellers bear entire burden.

	Before Tax	After Tax
Buyers Pay	\$10	\$10
Sellers receive net price of	\$10	\$10-\$1=\$9

Buyers pay the same price before and after the tax, whereas sellers receive a net price that is \$1 lower.