

Chapter

7

This is Microeconomics

The Behavior of Buyers and Sellers in Markets

review for
the exam

1. this chapter is about the behavior of consumers/buyers and producers/sellers in markets, including their **elasticity**, which is a measure of how sensitive one variable is to another
 - A. measures how sensitive the quantity demanded (Q_d) of a good or service by people, or the quantity supplied (Q_s) by firms/businesses, is to the price (P) of the good or service

what is the formula for
cross-price elasticity?

Cross-Price Elasticity of Demand

1. elasticity can measure **cross-price elasticity** (CPE) (cross-product sensitivity), which measures the responsiveness of the quantity demanded (Qd) for a good to a change in the price of another good

micro.
formula

#2

"Nooo..."

$\frac{\text{new-old}}{\text{old}} \times 100$

% change (▲) in quantity demanded for product A = CPE

% change (▲) in price of product B (muffins)

$$\frac{\frac{110-100}{100}}{\frac{90-100}{100}} = \frac{10}{-10} = -1$$

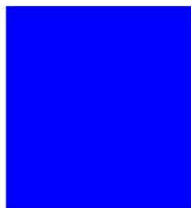
from 100 eggs demanded to 110 is a 10% increase (+10%)

(eggs)

from a P of \$1 to \$.90 is a 10% decrease (-10%)

S
I
C

- *If the cross-price elasticity ≥ 0 , then the two goods are substitutes for each other
- *If the cross-price elasticity $= 0$, then the two goods are independent of each other
- *If the cross-price elasticity ≤ 0 , then the two goods are complements of each other



Microeconomics Do-Now

1.

- (c) In the market for coffee, the equilibrium price is \$3.00 per cup and the equilibrium quantity is 100 cups per week. The cross-price elasticity of coffee with respect to muffins is -2
- (i) Are coffee and muffins normal goods, inferior goods, complementary goods, or substitute goods?
- (d) Suppose that when the price of toy cars increases by 10 percent, Theresa buys 5 percent fewer toy cars and 4 percent less of a different toy, blocks. Calculate the cross-price elasticity for toy cars and blocks and indicate if it is positive or negative.

Practice

1. If CPE is -1 , what are the two goods?
2. If CPE is 2 , what are the two goods ?
3. If CPE is 0 , what are the two goods?
4. If CPE is $.1$, what are the two goods?

what is the formula for the price elasticity of demand?

The Price Elasticity of Demand

- the **price elasticity of demand** (PED) is a measure of the sensitivity of the quantity demanded (Qd) of a good or service to the price (P) of the good
 - measures how a change in price impacts how much people want of something, like buying cigarettes when the tax on it increases
 - the answer is always reported as a positive, even if the result is negative, when determining the level of elasticity

micro.
formula
#3

$$\frac{-2}{10} = |-0.2|$$

the answer is

0.2

but you must use
the absolute value to
determine elasticity

$$\frac{\% \text{ change } (\blacktriangle) \text{ in quantity demanded}}{\% \text{ change } (\blacktriangle) \text{ in price}} = \text{PED}$$

from 100% to 98% is a 2%
decrease (-2%)

from a P of \$1 to \$1.10 is
a 10% increase (+10%)

"If/then"

$$\frac{\text{Qd } \frac{100\% - 98\%}{100} = \frac{-2\%}{100}}{\text{P } \frac{110\% - 100\%}{\$1} = \frac{+10\%}{100}} = \frac{-2}{10} = -0.2$$

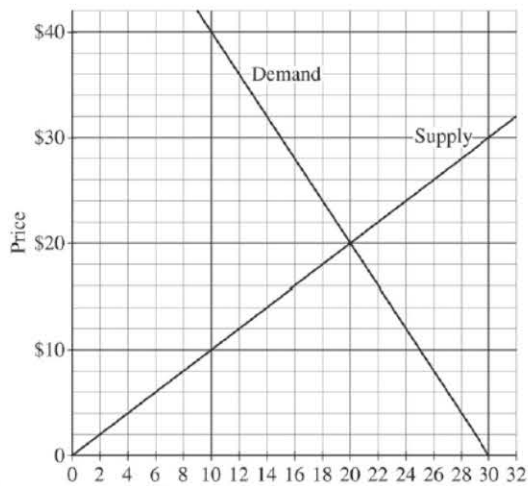
or...

"Nooo..."

$$\frac{\text{new-old}}{\text{old}} \times 100 = \frac{\text{Qd } \frac{98-100}{100} = \frac{-0.02 \times 100}{100}}{\text{P } \frac{1.10-1.00}{100} = \frac{0.1 \times 100}{100}} = \frac{-2}{10} = -0.2$$

Microeconomics Do-Now

3. The graph below shows the market for widgets. The government is considering intervening in this market.



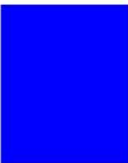
(e) Assume the price decreases from \$20 to \$12.

(i) Calculate the price elasticity of demand. Show your work.

~~(ii) In this price range, is demand perfectly elastic, relatively elastic, unit elastic, relatively inelastic, or perfectly inelastic?~~

(e) 2 points:

- One point is earned for calculating the price elasticity of demand as $\left[\frac{(24-20)/20}{(12-20)/20}\right] = -0.5$, or for correctly using the midpoint formula.
- One point is earned for stating that in this price range the demand is relatively inelastic.



Elasticities

1. goods for which the price elasticity of demand or supply is greater than 1 are called **elastic** or **relatively elastic**
 - A. people are sensitive to the price of these goods and buy less when they have less money, like traveling overseas
 - B. these goods are luxuries and have many substitutes
2. goods for which the price elasticity of demand or supply is less than 1 are called **inelastic** or **relatively inelastic**
 - A. people are not sensitive to the price of these goods and buy the same amount even if they have less money, like buying eggs
3. when the percentage change in quantity supplied (Qs) or quantity demanded (Qd) of a good is the same percentage as the change in price, elasticity = 1, the good is called **unit elastic**

graph
demand that is perfectly
elastic and include supply then
graph supply that is perfectly
inelastic and include demand

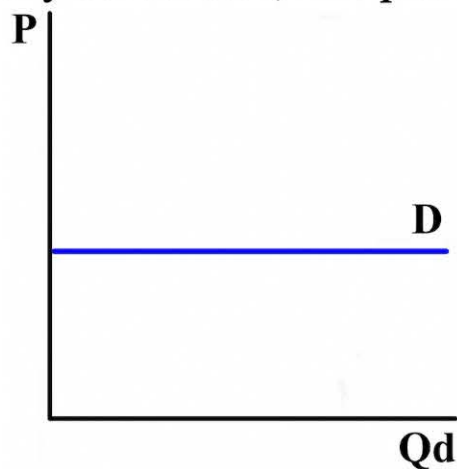
Elasticities (cont.)

1. **perfectly elastic** demand (D) is a perfectly horizontal demand curve at a specific price

A. people are completely sensitive to the price

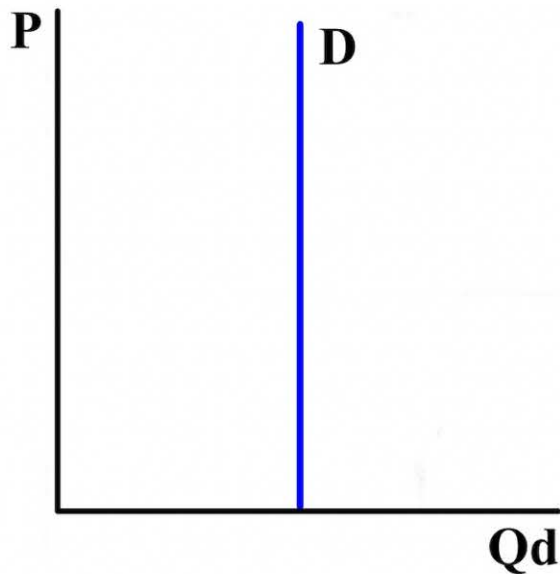
B. an increase in price (P) by a business reduces demand to zero; a decrease in price increases demand infinitely

C. perfectly elastic demand deals with goods and services are not usually necessary and have many substitutes, like plumbers



Elasticities (cont.)

1. **perfectly inelastic** demand is a perfectly vertical demand (D) curve at a specific quantity demanded (Qd)
 - A. people are completely insensitive to the price
 - B. the price elasticity of demand is "0" because when the price (P) changes, the quantity demanded (Qd) does not change, like with life-saving insulin



Elasticities (cont.)

Term

Value of PED

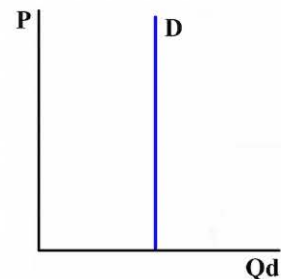
perfectly inelastic $\longrightarrow = 0$ (vertical demand curve)
(completely insensitive)

*insulin

inelastic/relatively inelastic $\rightarrow < 1$

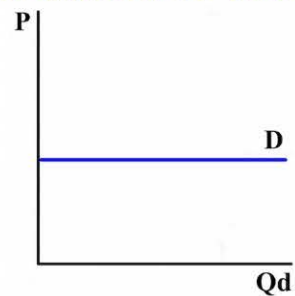
unit elastic $\longrightarrow = 1$

elastic/relatively elastic $\longrightarrow > 1$



perfectly elastic $\longrightarrow = \text{infinity}$ (horizontal D curve)
(completely sensitive)

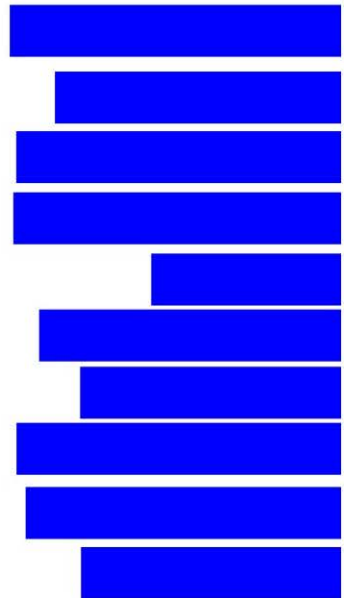
*plumbers



Elasticities (cont.)

What is the elasticity if the price elasticity of demand is:

- 1. 2 = elastic/relatively elastic > 1**
- 2. .75 = inelastic/relatively inelastic < 1**
- 3. 5 = elastic/relatively elastic > 1**
- 4. 0 = perfectly inelastic (vertical demand curve)**
- 5. infinite = perfectly elastic (horizontal demand curve)**
- 6 .99 = inelastic/relatively inelastic < 1**
- 7. 1.25 = elastic/relatively elastic > 1**
- 8. 1 = unit elastic = 1**
- 9. .5 = inelastic/relatively inelastic < 1**
- 10. .70 = inelastic/relatively inelastic < 1**



Microeconomics Do-Now

Please do this:

(a) The table below gives the quantity of good X demanded and supplied at various prices.

Price (dollars)	Quantity Demanded (units)	Quantity Supplied (units)
30	1	3
20	3	3
10	4	3

- (i) Is the demand for good X relatively elastic, relatively inelastic, unit elastic, perfectly elastic, or perfectly inelastic when the price decreases from \$30 to \$20 ? Explain.
- (ii) Is the supply of good X relatively elastic, relatively inelastic, unit elastic, perfectly elastic, or perfectly inelastic when the price decreases from \$30 to \$20 ? Explain.

(a) 3 points:

- One point is earned for stating that the demand for good X is relatively elastic, because the elasticity coefficient > 1 OR because total revenue rises as price decreases from \$30 to \$20.
- One point is earned for stating that supply is perfectly inelastic, because there is no change in the quantity supplied as the price changes OR because the supply elasticity is zero.



Revenue and the Price Elasticity of Demand

1. **revenue** is what a business earns before paying any costs
2. revenue is calculated as the price (P) times the quantity (Q)
3. when the price increases for a good, people pay more for each item, and this increases a firm's revenue at first
 - A. over time people will buy fewer items because of the increase in price, and this decrease in the quantity demanded (Qd) reduces revenue

what is the formula for the income elasticity of demand?

If a consumer's elasticity is...

less than 1

1

greater than 1

and a firm/business increases its price...

it's revenue increases

no change in revenue

it's revenue decreases



but if a firm/business decreases its price...

it's revenue decreases

no change in revenue

it's revenue increases



Income Elasticity of Demand

1. the **income elasticity of demand** (YED) is the quantity demanded (Qd) consumers are willing to buy because of a change in their income

micro.
formula

#4

$$\frac{4}{8} = \textcircled{.5} \quad \frac{\% \text{ change } (\blacktriangle) \text{ in quantity demanded } \overset{4\%}{}}{\% \text{ change } (\blacktriangle) \text{ in income } \underset{8\%}{}} = \text{YED}$$

2. if your income rises by 8% and because of that you buy 4% more ice cream, your income elasticity of demand is .5

3. if the answer is **positive**, the good you are buying is a normal good

4. if the answer is **negative**, the good you are buying is an inferior good



Microeconomics Do-Now

Please do this:

- (b) Assume that the income elasticity of demand for good Y is -2 . Using a correctly labeled graph of the market for good Y, show the effect of a significant increase in income on the equilibrium price of good Y in the short run.
- (c) Suppose that Theresa's income elasticity for bagels is -0.2 . Does the value of Theresa's income elasticity indicate that bagels are normal goods, inferior goods, substitutes, or complements?

What is the good if the income elasticity of demand is:

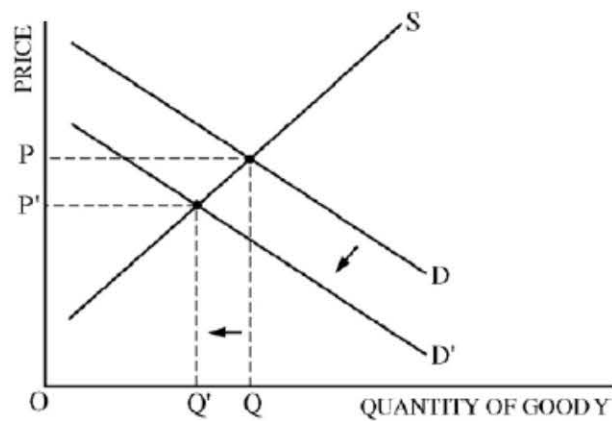
1. 2 a normal good
2. $-.75$ an inferior good
3. -5 an inferior good
4. 1 a normal good
5. $.01$ a normal good



Microeconomics Do-Now

Please do this:

- (b) Assume that the income elasticity of demand for good Y is -2 . Using a correctly labeled graph of the market for good Y, show the effect of a significant increase in income on the equilibrium price of good Y in the short run.



(b) 2 points:

- One point is earned for a correctly labeled graph of supply and demand.
- One point is earned for showing a leftward shift of the demand curve and a decrease in the equilibrium price.
- One point is earned for stating inferior goods.

Utility and Consumer Preferences

1. **utility** is a numerical indicator (any number) of a person's preference (benefit or satisfaction) for some goods compared to others, like Coke over Pepsi or chocolate over gummy bears
2. it is the level of satisfaction or benefit attained
3. utility simply means that the choice is preferred to another choice
4. utility can be any number

utility = 16

POUNDS OF
GRAPES

5	16	26	33	37	40	41
4	15	25	32	36	39	40
3	13	23	30	34	37	38
2	10	20	27	31	34	35
①	6	①16	23	27	30	31
0	0	11	17	21	24	25
	0	①	2	3	4	5

POUNDS OF BANANAS

Utility and Consumer Preferences (cont.)

1. one additional pound of grapes, from 1 pound of grapes and 1 pound of bananas to 2 pounds of grapes and 1 pound of bananas, increases utility by 4 (from 16 to 20)
2. this increase in utility is called the **marginal utility** (the difference (the margin) in utility (satisfaction) from consuming an additional unit of a good)

utility of 1 & 1 = 16
utility of 2 & 1 = 20

POUNDS OF
GRAPES

marginal
utility = 4
(20-16)

5	16	26	33	37	40	41
4	15	25	32	36	39	40
3	13	23	30	34	37	38
2	10	20	27	31	34	35
1	6	16	23	27	30	31
0	0	11	17	21	24	25
	0	1	2	3	4	5

POUNDS OF BANANAS

Utility and Consumer Preferences (cont.)

- total utility** or **utility** is the total benefit or satisfaction received from consuming a given total quantity of a good or service; all of the marginal utilities added up
- buying 1 unit gives someone the utility or total utility of 15
- buying 2 units gives someone the utility or total utility of 25 (15 + 10)
- buying 3 units gives someone the utility or total utility of 34 (15 + 10 + 9)

<u>Quantity</u>	=	<u>Total Utility</u> <u>or Utility</u>	<u>Marginal</u> <u>Utility</u>	<u>Total Utility</u> <u>or Utility</u>
0	=	0	0	0
1	=	15	15	15
2	=	25	10	25
3	=	34	9	34
4	=	39	5	39
5	=	42	3	42

Microeconomics Do-Now

Please do this:

Theresa consumes both bagels and toy cars.

Quantity of Bagels	Marginal Utility from Bagels (utils)	Quantity of Toy Cars	Marginal Utility from Toy Cars (utils)
1	8	1	10
2	7	2	8
3	6	3	6
4	5	4	4
5	4	5	3
6	3	6	2

- (a) The table above shows Theresa's marginal utility from bagels and toy cars. **What is Theresa's total utility from purchasing 3 toy cars?**

Microeconomics Do-Now

Theresa consumes both bagels and toy cars.

**Utility
or
Total Utility**

Quantity of Bagels	Marginal Utility from Bagels (utils)	Quantity of Toy Cars	Marginal Utility from Toy Cars (utils)
1	8	1	10
2	7	2	+8
3	6	3	+6
4	5	4	4
5	4	5	3
6	3	6	2

(a) The table above shows Theresa's marginal utility from bagels and toy cars.

Theresa's total utility from purchasing 3 toy cars?

(a) 3 points:

- One point is earned for determining the total utility, which is 24.

Measuring Willingness to Pay and Marginal Benefit

1. **marginal benefit** (MB) is the increase in benefit from, or the willingness to pay for, one more unit of a good
2. as a person consumes more and more of a good, the marginal benefit from additional amounts usually diminishes, like eating slice after slice of pizza
3. if you don't buy any pizza, the quantity is 0 and so is your willingness to pay and the benefit from not buying it
4. if you buy 1 slice of pizza, you may be willing to pay \$5 and your benefit is \$5
5. if you buy a second slice, you won't want to pay \$5, but maybe \$3, and thus \$3 is your marginal benefit

Quantity of X	Willingness to Pay for X (Benefit from X)	Marginal Benefit from X
0	\$0.00	—
1	you'll pay- \$5.00	\$5.00
2	you'll pay- \$8.00	\$3.00
3	you'll pay- \$9.50	\$1.50
4	you'll pay- \$10.50	\$1.00
5	you'll pay- \$11.00	\$0.50

when buying

The Price Equals Marginal Benefit Rule

1. **price equals marginal benefit** ($P = MB$) is a rule firms/businesses follow in order to maximize their profits: the price of an item they sell should always be at least equal to the marginal benefit people are receiving from it

A. why charge less than it costs to make it and less than consumers are willing to pay for it

what is the formula for the area of a triangle?

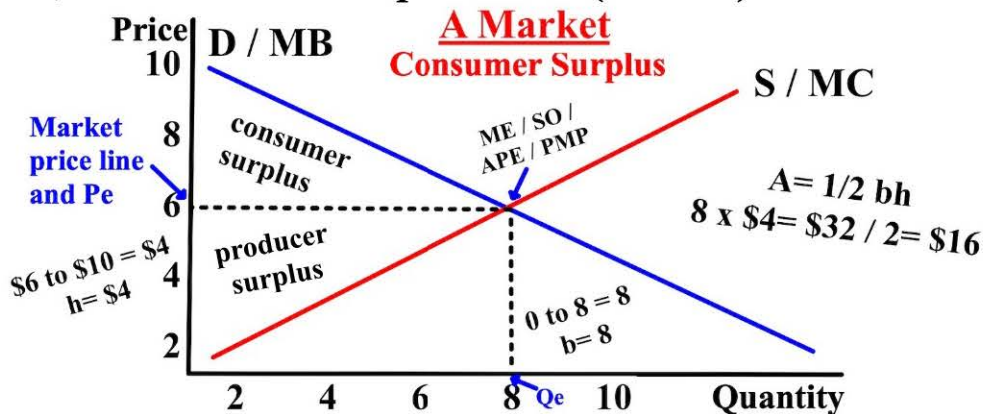
what is the formula for the area of a rectangle or square?

graph a market in equilibrium then label the consumer surplus CS, the producer surplus PS, and the socially optimal point SO; also label the equilibrium price P_e and the equilibrium quantity Q_e

Consumer Surplus- Graphically

1. people often are willing to pay more for an item than they have to
 - A. you might be willing to pay \$16 to see your favorite movie, but like everyone else, you pay only the \$8 admission price
2. the difference between the \$16, the marginal benefit (MB) price, and the \$8, is called **consumer surplus** (CS)
 - A. consumer surplus is the difference between your willingness to pay for an item (say \$16 for a movie), and the price you actually paid for it (\$8)
 - i. in this case, the consumer surplus is \$8 (\$16-\$8)

micro.
formula
#5



Consumer Surplus (cont.)

1. the **total consumer surplus** would be the marginal benefit (MB) of each product minus the price (P) of each product
2. at \$3 per unit, the total consumer surplus of consuming 3 units is \$16: \$12 - \$3 + \$8 - \$3 + \$5 - \$3 or \$16
3. the more that is consumed, the less marginal benefit is obtained and eventually the price per unit is more than the marginal benefit
 - A. buying less can sometimes be more beneficial

micro. formula #6

	<u>Quantity</u>		<small>(willingness to pay)</small> <u>Total Benefit</u>	<u>Marginal Benefit (MB)</u>	<u>Price (P)</u>	<u>Consumer Surplus (CS)</u>	<u>Total CS</u>
w	0	=	\$ 0	\$ 0	\$0	=	\$ 0
h	1	=	\$12	\$12	- \$3	=	\$ 9
n	2	=	\$20	\$ 8	- \$3	=	\$14
b	3	=	\$25	\$ 5	- \$3	=	\$16
u	4	=	\$28	\$ 3	- \$3	=	\$16
y	5	=	\$30	\$ 2	- \$3	=	\$15
i							
n							
g							

Microeconomics Do-Now

Please do this:

Martha has a fixed budget of \$20, and she spends it all on two goods, X and Y. The price of X is \$4 per unit, and the price of Y is \$2 per unit. The table below shows the total benefit, measured in dollars, Martha receives from the consumption of each good.

Quantity of X	Total Benefit from X	Quantity of Y	Total Benefit from Y
0	\$0	0	\$0
1	\$16	1	\$10
2	\$28	2	\$18
3	\$36	3	\$24
4	\$40	4	\$28
5	\$41	5	\$30

- (a) What is Martha's marginal benefit of the fifth unit of good X?
- (b) Calculate the total consumer surplus if Martha consumes 5 units of X. Show your work.
- ~~(c) Martha is currently consuming 4 units of X and 2 units of Y. Use marginal analysis to explain why this combination is not optimal for Martha.~~
- ~~(d) What is Martha's optimal combination of goods X and Y?~~
- (e) Indicate whether each of the following will cause the optimal quantity of good Y to increase, decrease, or stay the same.
- (i) The price of good Y doubles.
 - (ii) Martha's income falls to \$10 with no changes in prices.
 - (iii) Martha's income doubles, and the price of both goods double.

Microeconomics Do-Now

(a) 1 point:

- One point is earned for stating that the marginal benefit is \$1.

(b) 1 point:

- One point is earned for correctly calculating the total consumer surplus from consuming 5 units of X.

$$CS = (\$16 - \$4) + (\$12 - \$4) + (\$8 - \$4) + (\$4 - \$4) + (\$1 - \$4) = \$21$$

OR

$$CS = \$41 - \$20 = \$21$$

what is the formula for the price elasticity of supply?

Quantity of X	Total Benefit from X		Quantity of Y	Total Benefit from Y
0	\$0	MB P CS	0	\$0
1	\$16	16 -4 =12	1	\$10
2	\$28	12 -4 =8	2	\$18
3	\$36	8 -4 =4	3	\$24
4	\$40	4 -4 =0	4	\$28
5	\$41	1 -4 =-3	5	\$30

- One point is earned for stating that Martha's optimal combination is 3 units of X and 4 units of Y.

(e) 3 points:

- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will stay the same.

The Price Elasticity of Supply

- the **price elasticity of supply** (PES) is a measure of the sensitivity of the quantity supplied (Qs) of a good or service to the price (P) of the good
 - measures how a change in price impacts how much firms/businesses will produce of something, like the price of tvs
 - the answer is always reported as a positive, even if the result is negative, when determining the level elasticity.

micro.
formula
#7

$$\frac{\% \text{ change } (\blacktriangle) \text{ in quantity supplied}}{\% \text{ change } (\blacktriangle) \text{ in price}} = \text{PES}$$

from 100% to 97% is a 3% decrease (-3%)

from a P of \$1 to \$1.10 is a 10% increase (+10%)

$$\frac{-3}{10} = |-0.3|$$

the answer is

3

but you must use the absolute value to determine elasticity

"If/then"

$$Qd \frac{\frac{100\%}{100} = \frac{97\%}{97}}{P \frac{100\%}{\$1} = \frac{110\%}{\$1.10}} = \frac{-2}{10} = -0.2 = -2$$

or...

"Nooo..."

$$\frac{\text{new-old}}{\text{old}} \times 100 = \frac{Qd \frac{97-100}{100}}{P \frac{1.10-1.00}{100}} = \frac{-0.03 \times 100}{0.1 \times 100} = \frac{-3}{10} = -0.3 = -3$$