

Homework #2**Part I – Elasticity formulas. Questions 1- 8 are worth 5 points each. Questions 9 – 11 are worth 10 points each.**

1. Suppose a 15% decrease in price leads to a 45% increase in quantity demanded. What is the absolute value of the elasticity of demand? Is demand elastic, unit elastic, or inelastic?

$$E_D = \% \Delta Q_D / \% \Delta P = 45\% / -15\% = -3 \quad \text{Elastic.}$$

2. Suppose that the elasticity of demand is  $-0.7$ , and a shift in supply causes the price to increase 20%. What is the percentage change in quantity demanded caused by the change? Is it an increase or a decrease?

$$E_D = \% \Delta Q_D / \% \Delta P \quad -0.7 = \% \Delta Q_D / 20\% \Rightarrow \% \Delta Q_D = -14\% \quad \text{Decrease.}$$

3. Suppose there is a decrease in the supply of oranges, caused by a killer frost. You are told that the total expenditures on oranges have increased as a result. What can you conclude about the elasticity of demand for oranges – elastic, unit elastic, or inelastic?

A decrease in supply causes  $P$  to rise. Thus,  $P \uparrow$  and  $TE \uparrow$ . Demand is inelastic.

4. You're a smoker and know the elasticity of demand of cigarettes is  $-0.5$ . The government is proposing a tax that will increase the price of cigarettes by 30%. Will you spend more or less on cigarettes after the tax is imposed?

Demand is inelastic. For inelastic  $D$ , a  $P \uparrow$  leads to  $TE \uparrow$ .

5. True or false: If the elasticity of demand  $-1.5$ , then a 10% increase in the price of the good will lead to a 15% reduction in the expenditures on that good.

False. A 10% increase in the price will lead to a 15% reduction in quantity demanded. In this example, it turns out there is a 6.5% decrease in total expenditures.

6. You grow pot in your basement. Due to a bizarre response to public service announcements, there is an increase in the demand for pot. The elasticity of supply is 0.5. What will happen to your total revenue?

When supply is inelastic, a price increase leads to an increase in  $TR$ .

7. Did you need to know the elasticity of supply to answer the last question?

No, a price increase will cause a  $TR$  increase regardless of the elasticity of supply.

8. The cross price elasticity between Rum and Coke is  $-0.1$ . Suppose there is a 10% increase in the price of Coke. How much does the demand for Rum change? In what direction? Are Coke and Rum compliments or substitutes?

$$E_D = \% \Delta D_X / \% \Delta P_Y \quad -0.1 = \% \Delta D_X / 10\% \Rightarrow \Delta D_X = -1\% \quad \text{Thus, it is a 1% decrease in demand. Rum and Coke are compliments.}$$

9. Match the (made-up) elasticity of demand to the product:

$E_D = -2, -0.8, -0.2$       Brain surgery, Count Chocula, Bob Marley albums

$E_I = -2, 0.2, 5$       5 star Italian restaurant meals, Kraft Mac & Cheese, Top Ramen Noodles

The more substitutes a good has, the more elastic the demand for the good. Since Brain surgery has the fewest substitutes, it will tend to have the most inelastic demand curve (-0.2). I think they are few good substitutes for Bob Marley albums (-0.8), while there are many substitutes for Count Chocula (-2).

Intuitively, Top Ramen noodles is an inferior good (-2), Mac & Cheese is in the middle (0.2), and 5 start restaurant meals would have a high income elasticity (5).

You have some leeway here.

Brittany Spears is concerned that her manager is a moron, and thus solicits your advice. She is releasing a new album soon. She thinks she should raise the price 10%, but her manager disagrees. (Due to the fact that her albums are a unique product, Brittany is a price searcher, which means she can choose any price she wants along her demand curve, as she faces little competition. More later in the semester on price searchers....)

The marginal cost of producing copies of her CD is \$2, no matter how many albums she produces. The current price they are considering is \$10, and they estimate that Brittany would sell 100 albums. Thus, total expenditures on her albums would be \$1000, and total costs \$200, leaving her with \$800 of profit. You are considering increasing the price of her albums by 10% (to \$11). You know the elasticity of demand = -0.5.

10. How many albums would be purchased after the price increase?  
 What is the new value of total expenditures?  
 What is the new value of total costs?  
 What is the new value of profits?  
 Is her manager a moron?

$E_D = \% \Delta Q_D / \% \Delta P$       $-0.5 = \% \Delta Q_D / 10\% \Rightarrow \% \Delta Q_D = 5\%$ . Thus there will be a 5% reduction in quantity demanded, from 100 to 95.

Expenditures = Price \* Quantity = \$11 \* 95 = \$1045  
 Total costs = \$2 \* Quantity = \$2 \* 95 = \$190  
 Total profit = Total Revenue – Total Cost = \$1045 - \$190 = \$855     (TR = Price \* Quantity)  
 Her manager is a moron. She has a higher profit level when she charges the higher price.

11. Should you always raise the price of your good if the demand for your product is inelastic? Explain.

Yes. When you increase P, there will be a reduction in quantity demanded. Thus you will end up producing fewer goods.

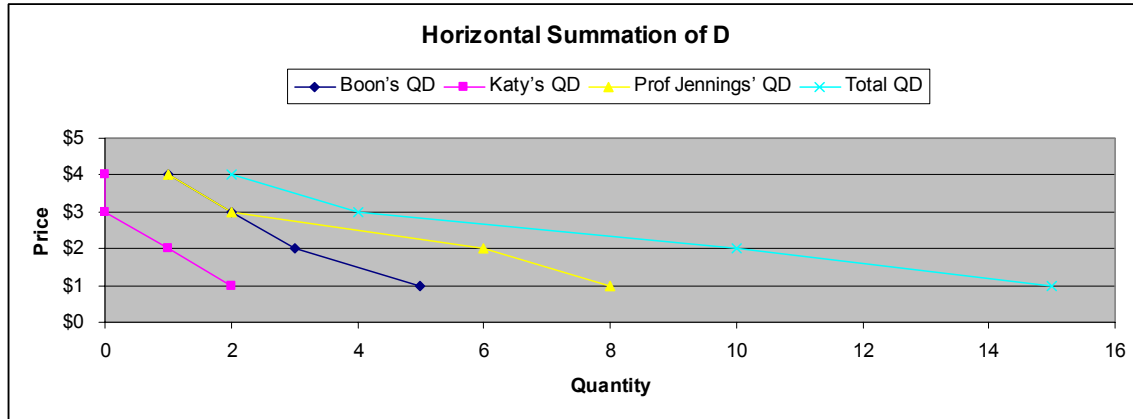
But, total expenditures (your total revenue) will increase when the price increases. Total costs will decrease because you are producing fewer goods. Thus, profits will increase.

Not too many producers are in the enviable situation of being able to raise their price (only price searchers) and even so, eventually as they raise their price, demand will become elastic. But if you can and your demand curve is inelastic, you should raise your price.

**Part II – Horizontal summation. Questions 12 - 13 are worth 15 points each. You’ll need a piece of graph paper or to be very neat.**

12. Suppose you are given the following information about several individual’s demand curve for “substances”. Pull out a piece of graph paper, and graph
- a. Boon’s demand curve (label it  $D_B$ )
  - b. Katy’s demand curve (label it  $D_K$ )
  - c. Prof. Jennings’s demand curve (label it  $D_J$ )
  - d. The market demand curve (label it  $D_M$ )

Price	Boon's Q <sub>D</sub>	Katy's Q <sub>D</sub>	Prof Jennings' Q <sub>D</sub>	Total Q <sub>D</sub>
\$1	5	2	8	15
\$2	3	1	6	10
\$3	2	0	2	4
\$4	1	0	1	2



13. Suppose you are given the supply (marginal cost curve) of a “typical” burger producer. Using the information below, graph the supply curve for this producer, labeling it S<sub>1</sub>. Next, suppose instead of one burger producer, there are two identical producers (two producers with the same MC of production). That is, there are two producers with the supply curve you have just drawn. Draw the market supply curve, labeling it S<sub>2</sub>. Do the same with three identical producers, labeling it S<sub>3</sub>.

Quantity	Marginal Cost	or...	Price	QS <sub>1</sub>	QS <sub>2</sub>	QS <sub>3</sub>
0	\$0	Alternatively...	\$0	0	0	0
1	\$4	You can look...	\$4	1	2	3
2	\$6	At it this way...	\$6	2	4	6
3	\$8		\$8	3	6	9
4	\$10		\$10	4	8	12

