

Economics 101  
Fall 2018  
Homework #3  
Due Thursday, November 8, 2018

**Directions:**

- The homework will be collected in a box **before** the lecture.
- Please place **your name, TA name, and section number** on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Late homework will **not** be accepted so make plans ahead of time.
- **Show your work.** Good luck!

**Please realize that you are essentially creating “your brand” when you submit this homework. Do you want your homework to convey that you are competent, careful, and professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional? For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you submit any work for someone else.**

Part I: Excise Taxes

1) Assume that in the market for LCD screens, demand and supply are described by the following equations where Q is the quantity of LCD screens and P is the price per screen:

$$\text{Demand: } Q_d = 300 - 10P$$

$$\text{Supply: } Q_s = 10P - 200$$

With this information, solve the problems below:

- a. Given the above information, find the market equilibrium price and quantity. Then calculate Consumer Surplus (CS), Producer Surplus (PS) and Total Surplus (TS).
- b. Now assume the government imposes an excise tax of \$5 per LCD screen sold. This excise tax is imposed on the producers of the LCD screens. What will be the equation that describes the new supply curve, written in x-intercept form, after the implementation of this excise tax?
- c. Given the excise tax described in (b), calculate the new equilibrium quantity, the price consumers pay with the tax, and the post-tax price producers receive once the excise tax is implemented.

d. Find the consumer surplus, producer surplus, and the government's tax revenue given this excise tax. Illustrate these areas on a clearly labeled graph.

e. Suppose you are told that the excise tax described in (b) has been implemented. You are also told that there has been a shift in the demand equation such that the new equilibrium quantity with the tax and this demand shift is now equal to the original equilibrium quantity. Given this information and holding everything else constant, write the equation for the new demand curve in x-intercept form. Assume that the new demand curve's slope is the same as the original demand curve's slope.

## Part II: International Trade

2) China and the United States are locked in an ongoing trade war as each country has introduced tariffs on goods traded with the other country. US President Donald Trump had promised in his campaign to fix China's "longtime abuse of the broken international system and unfair practices". Starting in January 2018 the U.S imposed a tariff on solar panel imports, most of which are manufactured in China. Suppose the domestic demand and supply for solar panels in the US are given by the following equations where Q is the quantity of solar panels and P is the price in dollars per unit of solar panels:

$$\text{Domestic Demand: } P = 70 - \frac{1}{5}Q$$

$$\text{Domestic Supply: } P = 10 + \frac{1}{5}Q$$

a. Calculate the equilibrium price, quantity, Consumer Surplus (CS), Producer Surplus (PS) and Total Surplus (TS) in the domestic market for solar panels when the US is in autarky (i.e. the market is closed to trade). Illustrate your answer graphically in a clearly and completely labeled graph.

b. Suppose the US now opens its solar panel market to international trade and the world price for solar panels is \$20 per solar panel. Furthermore, suppose the market for solar panels in the US is small relative to the global market for solar panels. Given this information, what is the new market price in the US? How many solar panels will be consumed domestically in the US market? How many solar panels will be imported/exported? Calculate the new Consumer Surplus, Producer Surplus and Total Surplus when the market for solar panels opens in the US. Illustrate your answers graphically in a clearly and completely labeled graph. Given your calculations determine the amount of deadweight loss in this market if the US decides to have a closed market rather than an open market. Explain how you found this deadweight loss value.

c. Suppose now the US government imposes a tariff in the solar panel market. With the imposition of this tariff you are told that the quantity of solar panels now supplied by the domestic producers is equal to the quantity of solar panels that are imported with the tariff. Given this information and holding everything else constant, determine the size of this tariff. Given this tariff what is the new price for a solar panel in the domestic market, the quantity consumed, the quantity imported, the Consumer Surplus, Producer Surplus, Government Tariff Revenue, Total Surplus and Deadweight Loss? Illustrate your answers graphically in a clearly and completely labeled graph.

d. Now suppose instead of the tariff described in (c), the government decides to set an import quota of 150 solar panels; i.e. only 150 solar panels may be imported into the US market. What is the new equilibrium price, quantity, surpluses (CS, PS and TS), license holder revenue and deadweight loss due to the imposition of this import quota? Illustrate your answers graphically in a clearly and completely labeled graph.

e. Suppose the US government decides to sell a single license to an importer granting the right to import and sell all the imported solar panels up to the import quota of 150 solar panels. At most how much would a seller be willing to pay in order to purchase the license to sell these solar panels? Explain your answer.

3) Assume that in the country of Turkmenistan, a mineral called potassium is a popular consumer good. Its domestic demand and supply are given by the following equations where  $Q$  is the quantity of units of potassium and  $P$  is the price per unit of potassium:

$$\text{Domestic Demand: } Q = 7000 - 200P$$

$$\text{Domestic Supply: } Q = 300P - 2000$$

a. Given this information find the equilibrium quantity and price in this market. Then calculate the consumer surplus and producer surplus. Draw a clearly and completely labeled graph to illustrate your answer. Hint: your numbers are likely to be a bit “messy” here: if you want to use a calculator you can, but we expect you to do the calculations!

b. Now suppose the government decides to open the country to trade, and the price of potassium in the rest of the world is \$20 per unit. If we assume that Turkmenistan is relatively small and thus has no influence on the world market, what will be the price of potassium in the country? How much potassium will the domestic consumers demand, and how much of it will be exported or imported?

c. Find the new consumer surplus, producer surplus and gains (provide a numerical value for these gains) in surplus from opening this market to international trade. Draw a new graph that represents clearly and completely the new area of consumer surplus, the new area of producer surplus, and the gains that occur due to the opening of the market.

Part III: Real vs. Nominal

4) Consider the following table of *nominal* prices in a fictional version of Madison over time:

Year	Coffee	T-shirts	Laptops
2015	\$4.00	\$20.00	\$660
2016	\$5.00	\$21.50	\$680
2017	\$4.75	\$22.00	\$620
2018	\$5.55	\$23.50	\$600

Suppose a typical consumer basket throughout the year consists of 100 cups of coffee, 20 T-shirts, and 1 laptop.

a. Using the above information to calculate the cost of the market basket for each of the years and present your calculations in the table below:

Year	Cost of Market Basket
2015	
2016	
2017	
2018	

b. Let 2015 be the base year, calculate the CPI for each year using a 100-point scale. Then, for 2016 to 2018, calculate the annual inflation rate. Round up your answers to two places past the decimal.

Year	CPI	Inflation Rate
2015		-
2016		
2017		
2018		

c. Now, 2015 is still the base year. Calculate the real price of T-shirt in each year. Again, show your answers calculated to two places past the decimal.

Year	Real price of T-shirt
2015	
2016	
2017	
2018	

d. Suppose we do not know the nominal price of T-shirts in 2014, but we do know that a cup of coffee costs \$3.25 and a laptop costs \$560.00. Additionally, we know that the rate of inflation from 2014 to 2015 was 25%. What was the nominal price of a T-shirt in 2014? To answer this question, you should assume that the defined market basket has not changed and that you have access to all the data provided or calculated in the problem thus far.

#### Part IV: Elasticity

5) Suppose you're running a firm that manufactures jeans. In January, your first month of operations, you were able to sell 3500 pairs of jeans at the price of \$90. You know that your business is facing a downward-sloping linear demand curve, but you don't have any information about the y-intercept or the slope of this demand curve. So, you have decided to simply lower the January price to \$80 and see what happens. Not unexpectedly, after the price went down, your customers got excited and purchased 4000 pairs of jeans in February.

a. Given this information and holding everything else constant, calculate the arc price elasticity of demand using the mid-point method. Round your answer to two places past the decimal.

b. From the given information reconstruct the demand equation and calculate the point elasticity for January as well as for February.

6) <sup>1</sup>This set of questions focus on elasticity.

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<sup>1</sup> Modified from homework#3-Fall 2017, Problem #5.

a. John's demand for bananas increases from 4 bananas to 6 bananas when his hourly wage rises from \$18 to \$30. What is his income elasticity of demand for bananas? Use the standard formula of percentage change to calculate this income elasticity. Are bananas normal or inferior goods for John?

b. John's demand for bananas dropped from 10 bananas to 6 bananas when the price of apples decreased from \$6 per apple to \$5 per apple. What is his cross-price elasticity of bananas for apples? Use the arc elasticity formula for the percentage change to calculate this cross-price elasticity. Based upon your value for the cross-price elasticity of demand of bananas for apples, are these two goods substitutes or complements? Explain your answer.

c. Suppose at \$4 per banana, Ben can supply an infinite quantity of bananas, but he will supply none at a price below \$4. What do you know about his supply when price rises above \$4? What is Ben's price elasticity of supply?