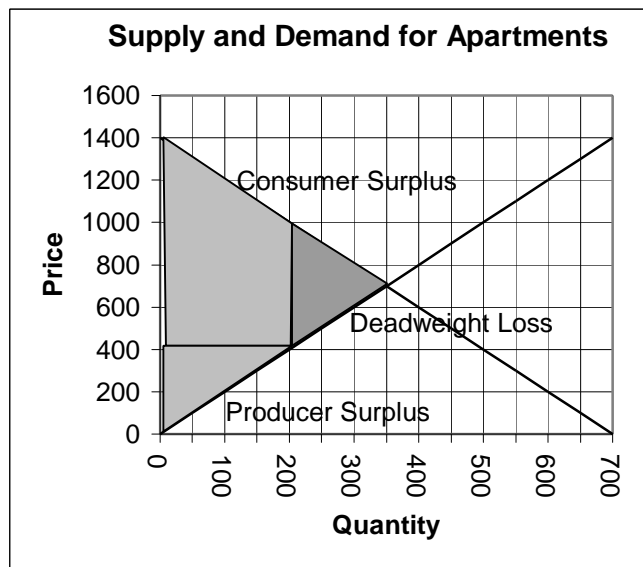
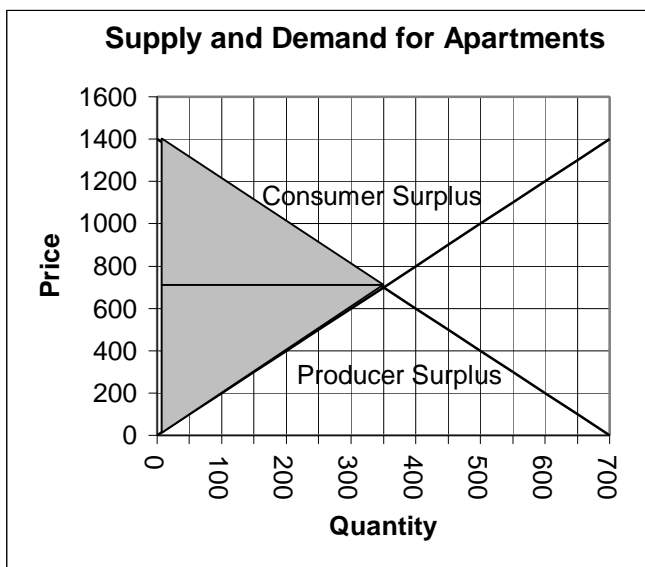


Homework #2 – Answer Key

1. Use the following graphs in answering this question. (The two graphs are identical – I put two because one graph would get too cluttered when you shade in the surpluses.)



a. What is the equilibrium rent and quantity of apartments rented in Kent?

P = \$700 and Q = 350 since this is where supply and demand cross.

b. Show on graph 1 the consumer surplus, producer surplus, and deadweight loss (if there is any).

Calculate the amount of consumer surplus, producer surplus, and deadweight loss.

See graph.

Consumer surplus = $\frac{1}{2} * 350 * \$700 = \$122,500$; Producer surplus = $\frac{1}{2} * 350 * \$700 = \$122,500$

c. Assume the city of Kent imposes rent control of \$400. With this **price ceiling**, what will be the rent and quantity of apartments rented in Kent?

P = \$400 and Q = 200

d. Show on graph 2 the consumer surplus, producer surplus, and deadweight loss (if there is any).

Calculate the amount of consumer surplus, producer surplus, and deadweight loss.

See graph.

Consumer surplus = $\frac{1}{2} * 200 * \$400 + 200 * \$600 = \$160,000$

Producer surplus = $\frac{1}{2} * 200 * \$400 = \$40,000$

e. Are consumers better off or worse off with rent control? Are landlords (producers) better off or worse off with rent control? Explain.

Some consumers (the 200 that still get apartments) are better off since their rent is lower; other consumers (the ones that use to rent apartments at a rent of \$700 but now can't find one for \$400 are worse off). In total, consumer surplus is a little higher with the rent control. Producers are much worse off with the rent control. The producers still renting apartments (the first 200) get a lower rent, and there are 100 landlords who no longer are willing to rent their apartments. Producer surplus is much lower.

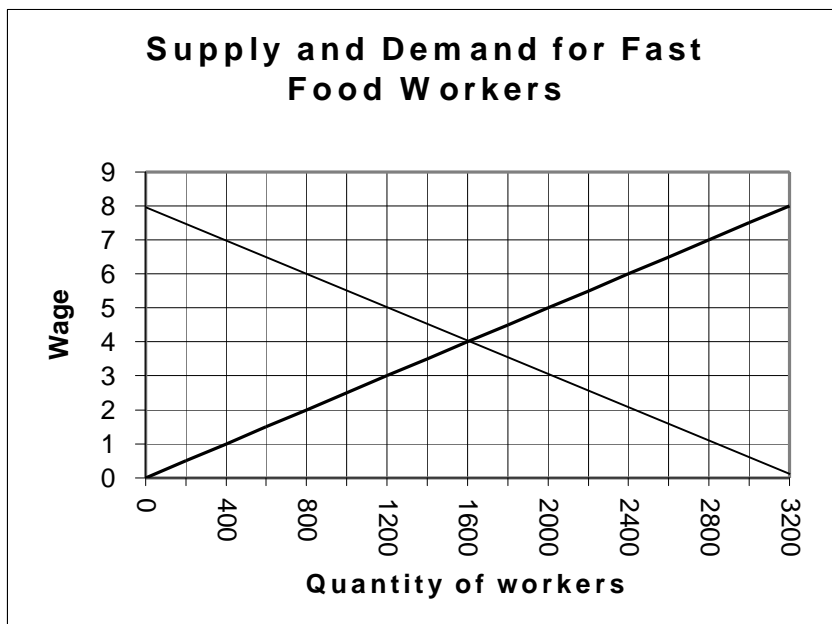
f. Is the market efficient with no rent control? Is the market efficient with rent control? Explain.

With no rent control the market is efficient. The marginal benefit of the last apartment rented (the 350th apartment) is \$700. We know this by looking at demand – someone was willing to pay \$700. The marginal cost of the last apartment rented (the 350th apartment) is also \$700. We know this by looking at supply – a producer was willing to rent the apartment for \$700. Since the marginal benefit to society equals the marginal cost to society, it is efficient.

With rent control the market is not efficient. The marginal benefit of the last apartment rented (the 200th apartment) is \$1000. (Looking at demand we see someone is willing to pay \$1000). The marginal cost of the last apartment rented is \$400. (Looking at supply we see someone is willing to rent it for \$400). The marginal benefit is greater than the marginal cost but we stopped producing. This means we are not producing enough apartments.

Another way to look at this inefficiency is by looking at the 300th apartment. That apartment is worth \$800 to someone (from demand) and only costs us \$600 to provide (from supply). As society, we have a way to spend \$600 that gives us a return of \$800 but we are not renting the apartment. This is true for all apartments from 200 to 350. This is the deadweight loss. The total surplus to society goes from $\$122,500 + \$122,500 = \$250,000$ to $\$160,000 + \$40,000 = \$200,000$. Society is \$50,000 worse off because of the rent control.

2. The demand curve and supply curve for fast food jobs are given on the graph below.



a. Suppose the government increases the minimum wage to \$6 per hour. Is there a shortage or surplus of workers? How many workers? How many workers are working with a minimum wage of \$6 compared to if there were no minimum wage?

There is a surplus of workers. 2400 people want to work, but only 800 are demanded for a surplus of 1600. At a minimum wage of \$6, there are 800 people working. With no minimum wage, 1600 people would be working.

b. What would be the result of a minimum wage of \$3.00 per hour?

If there were a minimum wage of \$3.00 per hour, the wage would still be \$4 per hour and 1600 people would be working. This is because the minimum wage is lower than the equilibrium wage.

c. Do you think it would be a good idea for the U.S. to raise the minimum wage above the current amount of \$5.15 per hour? Substantiate your view using economic reasoning.

Answers to this question will vary. The good point of raising the minimum wage is people who have a job will get paid more money. The bad points of raising the minimum wage are: some people will lose their jobs (with a price ceiling the quantity is less than what it would be without a price ceiling), and there will be deadweight loss (people are willing to work at a wage at which companies are willing to hire them, but since that wage is less than minimum wage the company is not allowed to hire them; we could be making people better off by letting them work but we don't do it). Basically whether or not we should raise the minimum wage depends on if you think the good outweighs the bad.

3. Suppose Kent State increases the student price of parking passes from \$100 to \$200. The number of parking passes bought decreases from 6,000 to 2,000.

a. What is the price elasticity of demand? Is this elastic or inelastic? Show your calculations.

$$\% \text{ change in quantity} = (2000 - 6000) / [(2000 + 6000) / 2] = -4000 / 4000 = -1$$

$$\% \text{ change in price} = (\$200 - \$100) / [(\$200 + \$100) / 2] = \$100 / \$150 = 0.667$$

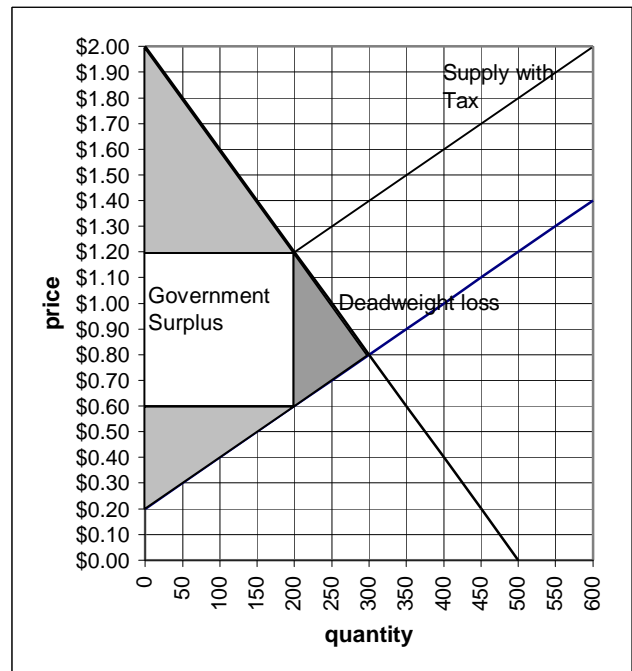
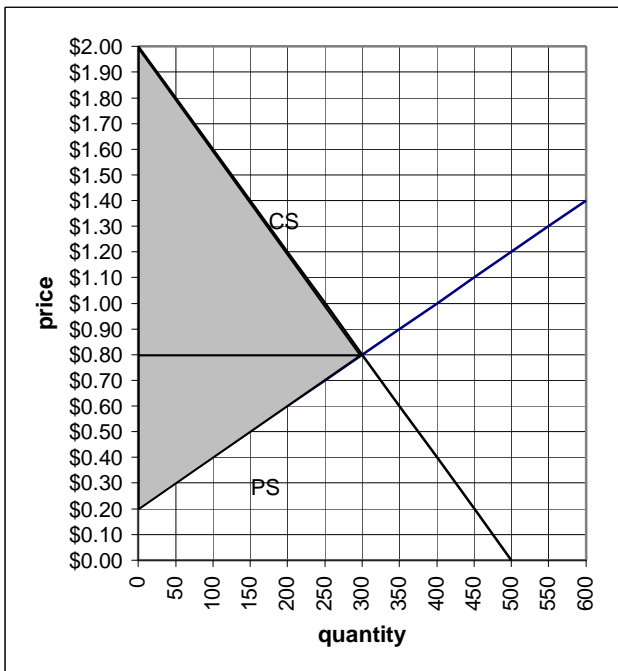
$$\text{Elasticity} = |\% \text{ change } Q / \% \text{ change } P| = |-1 / 0.667| = 1.6$$

This is elastic because it is greater than 1.

b. If the University is trying to get the most parking revenue possible, does the University want to raise their price from \$100 to \$200? Defend your answer.

If they are trying to get the most parking revenue possible, they do not want to raise the price. Since demand is elastic, raising the price will result in a big reduction in the number of people who want to buy passes and their total revenue will go down.

4. The graphs below shows the supply curve and demand curve for cigarettes. (The two graphs are identical – I put two because one graph would get too cluttered when you shade in the surpluses.)



a. What is the equilibrium price and quantity with no tax?

P = \$0.80; Q = 300

b. Draw the consumer surplus and producer surplus on the first graph.

See graph (CS is consumer surplus; PS is producer surplus)

c. The government imposes a tax of 60 cents per pack on cigarettes. Find the new equilibrium price and quantity with the tax.

To find the new price and quantity, you first must shift the supply curve up by the amount of the tax (.60) and see where the new supply crosses demand. The price is \$1.20 and the quantity is 200.

d. Draw the consumer surplus, producer surplus, government surplus (government tax revenue) and deadweight loss on the second graph.

See graph

e. Who has the higher tax incidence of this tax? Explain what we mean by tax incidence.

Consumers have the higher tax incidence. Their price goes from \$.80 with no tax to \$1.20 with the tax, an increase of \$0.40. Supply price goes from \$.80 with no tax to \$.60 with the tax (consumer pays \$1.20 and .60 of it goes to the government in tax), a decrease of \$0.20. Since consumer price changed by more than supplier price, consumers have the higher tax incidence. This means that consumers have to pay a greater share of the tax burden.

f. Given your answer to part (e), what do you know about the elasticity of demand compared to the elasticity of supply?

Since consumers have the higher tax incidence, we know that demand is more inelastic than supply. Consumers are less price sensitive, so most of the tax gets passed on to them. (Note: This is true in this example, but not always. We have to answer part e before we know if demand is more or less inelastic than supply.)

g. Is the market efficient with the tax? Explain.

No. With the tax there is deadweight loss. The marginal benefit of the 200th unit is \$1.20 (from the demand curve) and the marginal cost is \$0.60 (from the original supply curve). Since marginal benefit is greater than marginal cost, we should be making more.

5. What is the cross price elasticity of demand if a price decrease from \$5 to \$4 for a sandwich from Subway decreases the quantity demanded of sandwiches at Franklin Square Deli from 400 to 300? Show your calculations.

$$\% \text{ change in quantity} = (300 - 400) / [(300 + 400) / 2] = -100 / 350 = -0.286$$

$$\% \text{ change in price} = (4 - 5) / [(4 + 5) / 2] = -1 / 4.50 = -0.222$$

$$\text{Elasticity} = \% \text{ change quantity} / \% \text{ change price} = -0.286 / -0.222 = 1.29$$

6. What is the income elasticity of demand if income decreasing from \$30,000 to \$25,000 causes the quantity demanded for bowling to increase from 1500 to 1600? Show calculations. In this example, is bowling a normal or inferior good? How do you know?

$$\% \text{ change in quantity} = (1600 - 1500) / [(1600 + 1500) / 2] = 100 / 1550 = 0.065$$

$$\% \text{ change in income} = (25,000 - 30,000) / [(25,000 + 30,000) / 2] = -5000 / 27,500 = -0.18$$

$$\text{Elasticity} = \% \text{ change Q} / \% \text{ change income} = .065 / -.18 = -0.36$$

In this example, bowling is an inferior good since the income elasticity is negative. When income goes down, the quantity of bowling goes up.

7. Terry derives utility from bottled water and Mt. Dew according to the following table. A bottle of water costs \$1 and a Mt. Dew costs \$1. Assume that Terry cannot buy partial bottles of water or Mt. Dews.

# Bottles Water	Total Utility Water	# Mt. Dews	Total Utility Mt. Dew
1	200 200	1	100 100
2	360 160	2	190 90
3	500 140	3	270 80
4	620 120	4	340 70
5	720 100	5	400 60
6	800 80	6	450 50
7	860 60	7	490 40
8	900 40	8	520 30

a. Terry's income is \$7. How many bottles of water and how many Mt. Dews would he consume to maximize his total utility? **Terry buys 5 water and 2 Mt. Dew. To find this, we calculate his marginal utility by taking the change in total utility when the quantity increases. Terry spends each \$1 on what gives him the most Marginal Utility. I have put marginal utility in the table above in bold.**

b. If the price of bottled water increases to \$2, and Terry still has income of \$7, how many bottles of water and how many Mt. Dews would he consume to maximize his total utility?

Terry buys 2 water and 3 Mt. Dew. We do the same thing as in part a, but compare 2 bottles of water to each Mt. Dew.

c. What is Terry's price elasticity of demand for bottled water? (Think about how many he wanted to buy in part a compared to part b. How did his demand for water change when the price of water changed? Use this to find his elasticity of demand.)

$$\% \text{ change Price} = \frac{1 - 2}{1.5} = \frac{-1}{1.5} = -.667 \quad \% \text{ change Quantity} = \frac{5 - 2}{3.5} = \frac{3}{3.5} = .857$$

$$E_d = |\% \text{ change quantity} / \% \text{ change price}| = -.667 / .857 = .78$$

d. When the price of water changes (goes from \$1 to \$2), does the income effect say buy more/less water? Mt. Dew? Does the substitution effect say buy more/less water? Mt. Dew?

Income effect: less water and less Mt. Dew since Terry's purchasing power has gone down.

Substitution effect: less water and more Mt. Dew since water is now more expensive relative to water.

e. For Mt. Dew, when the price of water changes (goes from \$1 to \$2) which of the following statements is true? How do you know?

- i. the income effect is bigger than the substitution effect
- ii. the income effect is smaller than the substitution effect
- iii. the income and substitution effects are equal

ii. The income effect must be smaller than the substitution effect since Terry buys more Mt. Dew when the price of water goes up (buys 3 instead of 2). The income effect says buy less, and the substitution effect says buy more – the fact he bought more indicates the substitution effect must be bigger.