Department of Economics
University of California, Berkeley
Problem Set #2

Fall 2019
Economics 1
Page 1 of 6

PROBLEM SET #2 Suggested Solutions

1.   (3 points total; 1 point each) Supply and Demand
For each of the events described below, **sketch a supply and demand graph** that illustrates the event. Be sure to properly label all curves and relevant points in your graph. In the area to the left of your graph, **explain why you think your graph is correct.** In that area, **also answer the questions asked.**

a.   E-cigarettes. Multiple credible reports are published detailing the adverse health effects of e-cigarettes (vaping). This is new information: the e-cig industry had been basing its advertising around alleged health benefits of e-cigarettes over tobacco products. What is the effect on the price of e-cigarettes? On the quantity of e-cigarettes sold per month?

*For all supply/demand questions like this, we assume that all other things – aside from what is specified in the question – stay the same (that is, we make the "ceteris paribus" assumption). **Do not add events to the question that are not there**. Assume all other factors are held constant.*

The question asks about the supply and demand for e-cigarettes (vaping).

Step 1: draw the initial equilibrium (E1) at P1 and Q1.

Step 2: How do we capture the event? When the credible reports of adverse health effects come out, fewer e-cigarettes are demanded at each price. This is a <u>decrease in demand</u>: at every possible price of an e-cigarette, there is a decreased quantity of e-cigarettes demanded. The entire <u>demand curve shifts to the left</u>.
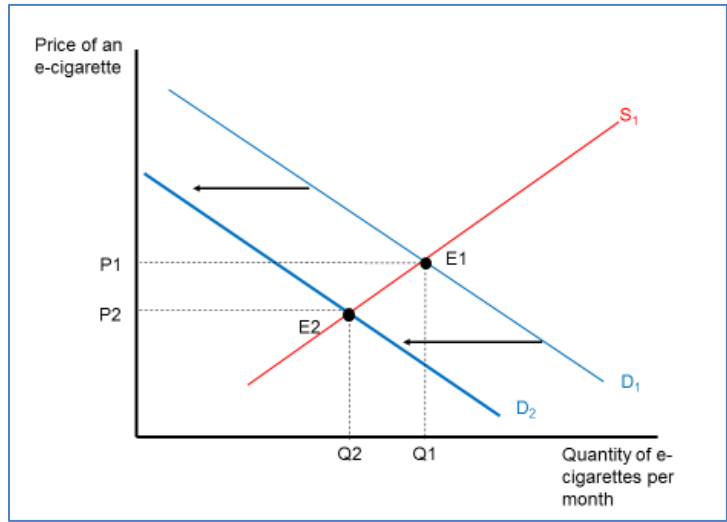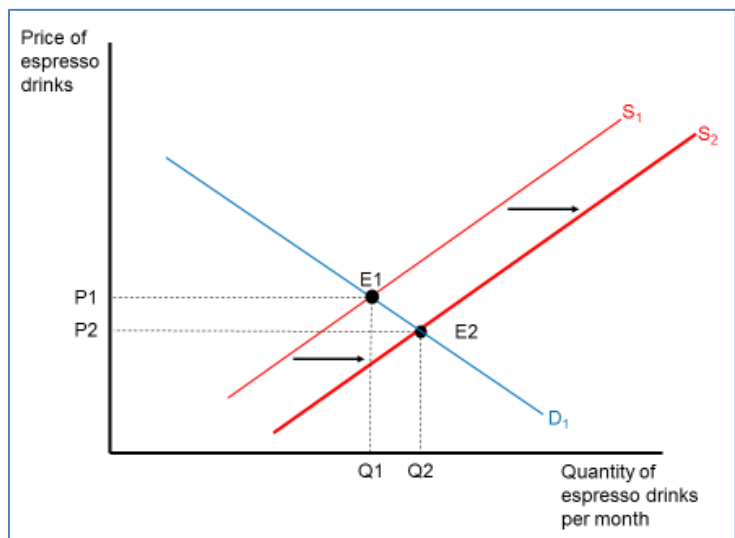

Step 3: What is the effect on price and quantity? The shift to the left of demand (a decrease in the quantity demanded at every possible price), results in <u>a decrease in price</u> and <u>a decrease in the quantity sold</u>. The second equilibrium is shown as E2 in the graph at the right.

b.   Take out espresso drinks in Berkeley. Rather than having a person make your espresso drink, coffee shops in Berkeley switch to robotic baristas. The people were paid $15.59 an hour. The robots cost just $3 an hour to operate. What is the effect on the price of espresso drinks? On the quantity of espresso drinks purchased in Berkeley per month?

The question asks about the supply and demand for espresso drinks at local Berkeley coffee shops.

Step 1: draw the initial equilibrium (E1) at P1 and Q1.

Step 2: How do we capture the event? The substitution of robots that cost $3 an hour to operate for people who are paid $15.59 an hour lowers input costs. When input costs decrease, more cups of espresso are offered for sale at each price. This is an <u>increase in supply</u>: at every possible price of an espresso drink, there is an increased quantity of espresso drinks available for sale. The entire <u>supply curve shifts to the right</u>.

Step 3: What is the effect on price and quantity? The shift to the right of supply (an increase in the quantity supplied at every possible price), results in <u>a decrease in price</u> and <u>an increase in the quantity sold</u>. The second equilibrium is shown as E2 in the graph at the right.

c.   Boba tea. Getting a cup of boba tea before class becomes the popular thing to do in Berkeley. Even people who had never heard of boba tea before moving to Berkeley are now drinking it. At the same time, more boba tea shops open in Berkeley. What is the effect on the price of a cup of boba tea? On the number of cups of boba tea sold purchased in Berkeley per month?

The question asks about the supply and demand of boba tea. There are two events that happen at the same time.

Step 1: draw the initial equilibrium (E1) at P1 and Q1.

Step 2: How do we capture the event? There are two events specified. Let's take them one at a time.

The first event: getting a cup of boba tea has increased in popularity. This is a shift in preferences which causes an <u>increase in the demand</u> for boba tea. At every possible price of boba tea, there are more cups of boba tea demanded per month. When there is an increase in demand, the <u>demand curve shifts to the right</u>.
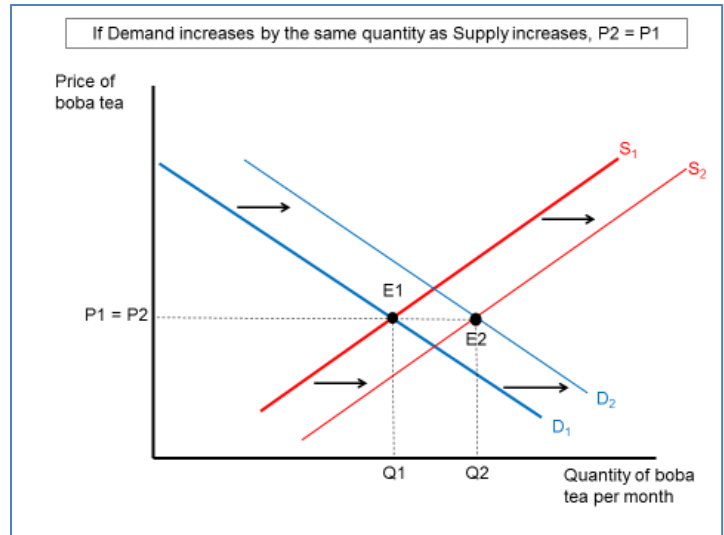
The second event: More boba tea shops open in Berkeley. That is, there is an increase in the number of sellers. This event causes an <u>increase in supply</u> of boba tea, which means at every possible price of boba tea, there is an increased quantity of boba tea available for sale. The entire <u>supply curve shifts to the right</u>.

Step 3: What is the effect on price and quantity? The shift to the right of demand (an increase in the quantity demanded at every possible price), results in <u>an increase in price</u> and <u>an increase in the quantity sold</u>. The shift to the right of supply (that is, an increase in the quantity supplied at every possible price), results in <u>a decrease in the price</u> and <u>an increase in the quantity sold</u> at equilibrium.
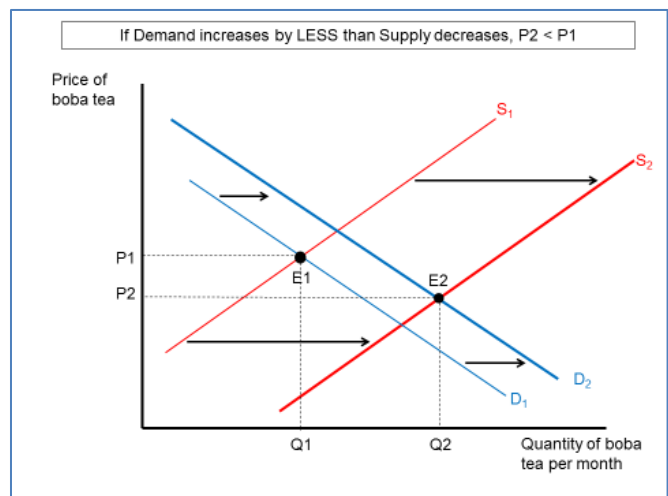
Both events lead to an increase in the quantity, so we know the effect on quantity: it will increase.
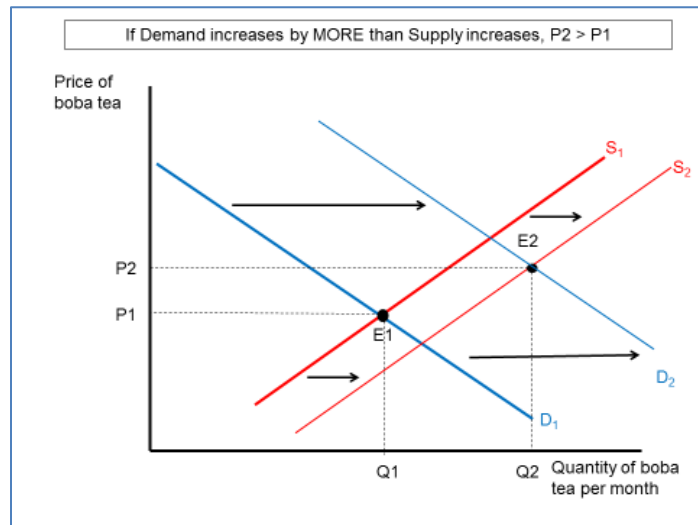
But there are opposing effects on price. The change in demand due to the shift in preferences puts upward pressure on price but the increase in supply due to more stores opening puts downward pressure on price. What is the net effect on price? It depends. (You'll find "it depends" is often the answer in economics. It's never a sufficient answer, though. We need to know <u>on what</u> it depends.)

The net effect on price depends on which shift is larger: the increase in demand or the increase in supply.   If you drew the shifts the same size, then you had no effect on price. If you shifted demand more than you shifted supply, price P2 is more than price P1. If you shifted supply more than you shifted demand, P2 is less than P1.

The graphs illustrate why this is the case. The demand curve shifts to the right and the supply curve shifts to the right changing the equilibrium point from E1 to E2. In all cases, equilibrium quantity increases from Q1 to Q2.   The effect on price depends upon which curve shifts more: neither (price unchanged), demand (price rises), or supply (price falls).

Department of Economics
University of California, Berkeley
Problem Set #2

Fall 2019
Economics 1
Page 3 of 6

A typical student question at this point: in a parallel question on an exam, do we need to draw all three graphs? No. On an exam, you are almost always provided with axes to use for your graph and in a parallel question you would be provided with only one set of axes. But what you do need to do is discuss why one effect (p or q) is known with certainty and the other is ambiguous. And you should indicate you know what it depends upon. So for instance, you could have drawn any of those three graphs on page 2, but then you should include in your explanation an explicit (say it, don't just think it) acknowledgement that you invoked an assumption about the relative sizes of the shifts in supply and demand, and that your result with regard to (which one: p or q?) would be different (in which way: increase or decrease?) if you had drawn one of the curves (which one: S or D?) with a different size of shift (different how: larger or smaller?).

2. (2 points total). Effect of a tax

Consider the market for women's sweaters manufactured in China and sold in the United States. The market is initially in equilibrium at a price of $75 per sweater and 1,000 sweaters sold per month. Then a tax (a tariff) is imposed on each sweater imported from China. The tax is paid to the U.S. government by the importer, which is the U.S. seller of the sweater. Although in reality the tax is expressed as a percentage of the sweater's price, to make this question easier to answer we will assume the tax is a flat dollar amount of $25.

A. Using the axes at the right, show the effect of the tax on the equilibrium price and quantity sold. Assume the tick marks for the vertical axis are at $25 intervals, and the tick marks for the horizontal axis are at intervals of 250 sweaters per month. No need to write anything in response to part A.
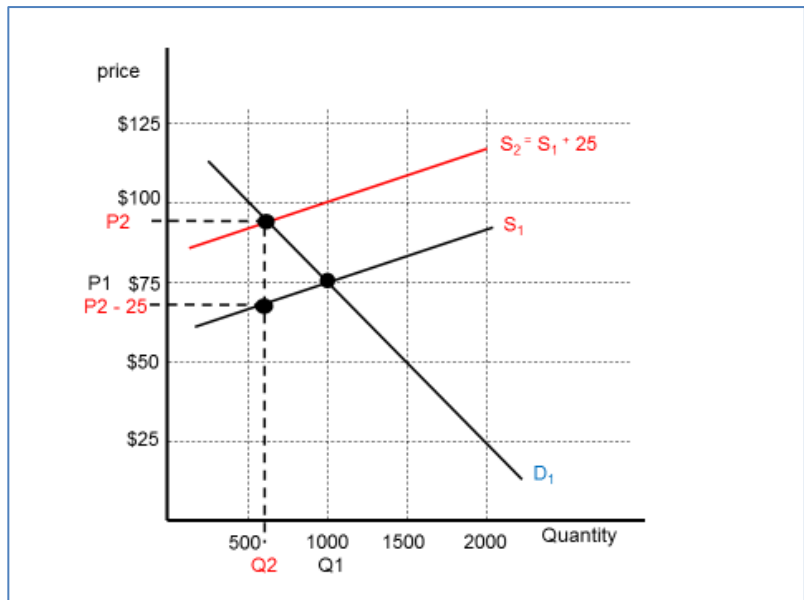
You should have drawn a graph that had an initial equilibrium of p=$75 and q=1,000. The slopes you used for S and D were up to you. Because the slopes of S and D were up to you, the specific result you came up with for the change in p was also up to you (that is, dependent upon precisely how you drew your graph). Your new price P2 should have been between 75 and 100. The price the seller retained should be P2-25 because the tax is $25. One sample graph is shown at the right.

B. Based on your graph, who bears the greater burden of the tax: the U.S. buyer or the U.S. seller? In general, under what conditions would the buyer bear a larger burden of the tax than the seller?

The specific answer will depend on your graph. In general, the burden of the tax is calculated this way
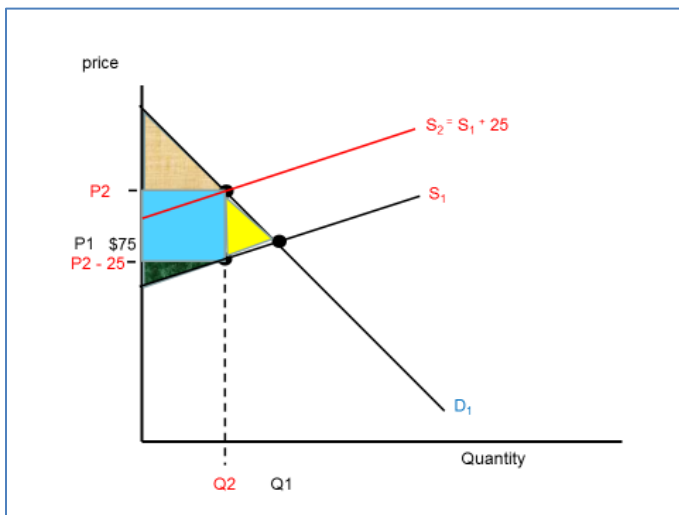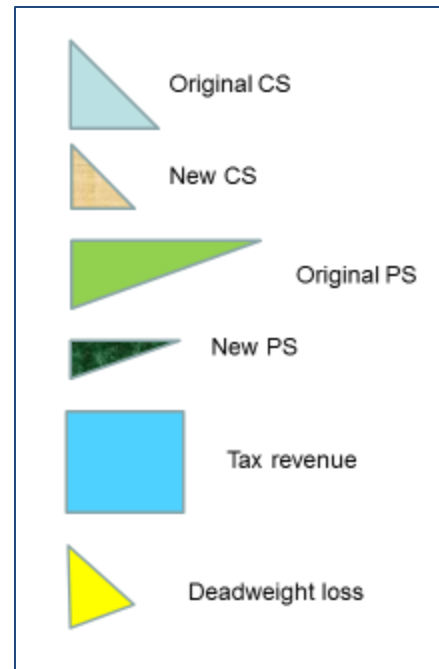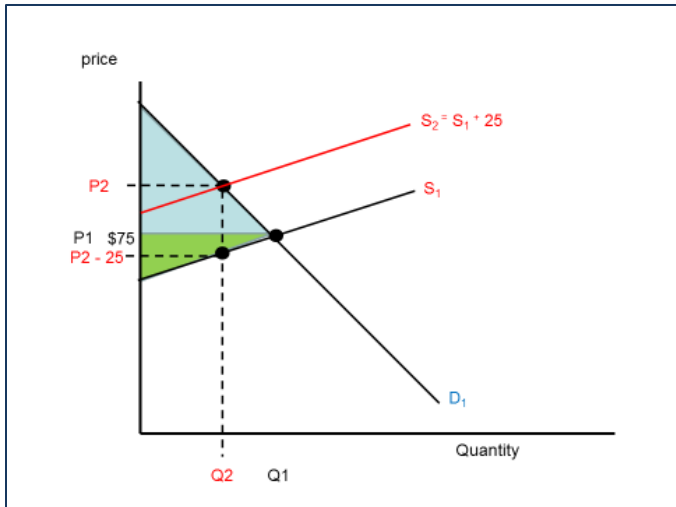
$$Buyer's\ Burden = \frac{P_2 - P_1}{T}$$

$$Seller's\ burden = \frac{P_1 - (P_2 - T)}{T}$$

Based on the graph above in the solutions, the buyer is bearing the greater burden in this case.

In general, when the demand curve is steeper than the supply curve at the original equilibrium, the buyer will bear the greater burden of the tax. When the supply curve is steeper than the demand curve, the seller will bear the greater burden of the tax. If the slopes are equal (in absolute value), the burden will be equally shared.

C. On the axes at the right, using colored pencils or pens if you would please, sketch again the effect of the tax and this time show the pre-tax amounts of consumer and producer surplus, the post-tax amounts of consumer and producer surplus, the tax collected by the government, and the amount of deadweight loss. In the area below, provide the legend (what color or striping or other indicates which concept).

Graph is on the next page. Turns out this is hard to do in powerpoint (way easier by hand!) so what I've done here is draw two graphs. By hand, I used a combination of colors and lines (vertical, horizontal, diagonal) to depict each of the relevant areas.

Department of Economics
University of California, Berkeley
Problem Set #2

Fall 2019
Economics 1
Page 4 of 6

D.   Some people who supported the imposition of tariffs on imports from China argued that the tariffs would make Chinese imports more expensive and thereby increase demand for U.S. manufacturing. In fact, the tariffs on Chinese imports seem to be benefitting manufacturing in Thailand, India, Cambodia and other Asian and south Asian economies. Identify one condition under which the tariff on Chinese imports would benefit US manufacturing, but which in fact is not true (not satisfied).

Think back to the reader article about Everlane and sweaters. They are shifting their supply chains, when they can, to other countries in Asia. The imposition of tariffs assumed that making Chinese imports more expensive with tariffs would lead companies like Everlane to shift their supply chains to US manufactures. This would have happened only under the condition that there were not alternative suppliers (substitutes!) available at the right combination of price, quality, transportation logistics & costs in countries other than China.

3.   (1 point) Price Elasticity of Demand
You are an analyst for Southern California Edison, a public utility in SoCal that provides electrical service to homes (residences) and businesses. Your task is to design a change in electrical rates that will increase total revenue received by SoCal. For each cell below, indicate whether you would increase or decrease rates, and give a brief explanation as to why.

Your answers here will vary. In all cases, your answer should reflect the relationship between price elasticity of demand and total revenue. What assumptions you made about relative price elasticity of demand were up to you but you had to give a

defense. So your answers should have included two things.

[1]   An indication that you understand the determinants of price elasticity of demand. That means you defended your assumption about price elasticity of demand in each of the 4 cells with a reference to either the # of substitutes, the share of total budget, or the time frame.

[2] Evidence you understand the relationship between price elasticity of demand and total revenue. If demand is relatively price-elastic, then decrease price to increase total revenue. If demand is relatively price-inelastic, then increase price to increase total revenue.

Be sure you also know what it means for demand to be relatively price-elastic or relatively price-inelastic. In particular, know in which cases the % change in quantity demanded is > or < % change in price.

A common mistake we see in questions like this is students referencing the fact the demand curve slopes down (a higher price will decrease quantity demanded; a lower price will increase quantity demanded) without recognizing that the issue is not whether the demand curve slopes down but how aggressively quantity demanded responds to changes in price. You can think of this as how steep is the demand curve at the current price. (In Econ 100A you get much more of the math and use calculus to discuss the relationship between price elasticity, slope of D, and total revenue. Here in Econ 1, we skip the calculus and focus on the intuition.)

4.   (1 point) Price Ceilings and Floors

The state of California is poised to enact rent control for the entire state, limiting annual rent increases to inflation-plus-5 percent and tightening the restrictions on eviction of tenants for the purpose of finding new tenants who will pay a much higher rent. A recent article on the bill is at https://www.nytimes.com/2019/09/11/business/economy/california-rent-control.html. Poll 100 economists and well over 90 of them will tell you "rent control is bad." (Search "economists rent control" and you'll find a bevy of articles about how and why economists hold this opinion.)

A.   At the right, draw a graph that depicts the effect of rent control on the market for rental housing. Assume the supply of housing is upward sloping but not vertical. Be sure to label everything clearly. If your labels are clear, there's no further explanation or words needed for part A.
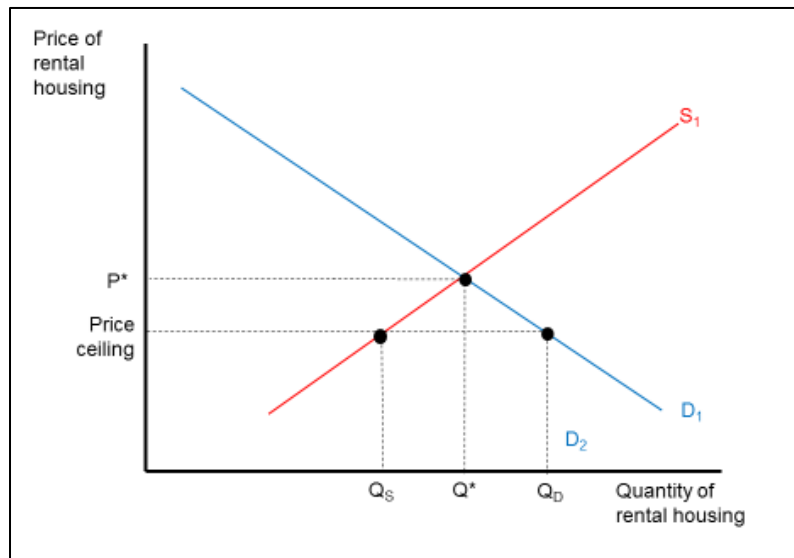
B.   In the absence of rent control, who is able to rent an apartment? Is your answer different in the presence of rent control? Answering that second question requires you to think about (and make explicit in your answer) the mechanism by which available apartments are allocated.

In the absence of rent control, renters are the people who are willing and able to pay at least the market equilibrium price, depicted here as P*. So if P* = $3,000 per month, then apartments go to people who are willing and able to pay $3,000 or more per month for an apartment.

If there is rent control, then not everyone who wants to rent an apartment at the rent control price (shown as "price ceiling" in the graph) is able to do so. At the price ceiling, the quantity demanded of apartments (Q_D) is much greater than the quantity supplied of apartments (Q_S). There needs to be some non-price rationing mechanism of determining who gets to rent an apartment. Supposed Q_D = 500 and Q_S = 300. Then there are 200 more people who want to rent an apartment at the rent controlled price than there are apartments available to rent. What's the process of deciding which 300 of those 500 interested people get to rent the apartment? First come, first serve? Fill out an application and get picked by the landlord.

Department of Economics
University of California, Berkeley
Problem Set #2

Fall 2019
Economics 1
Page 6 of 6

Be friends with the landlord or the current tenants? Offer to break the law and give the landlord extra $$ if they choose you as the tenant?

Note what will happen if there are illegal side payments . . . the market will return to the equilibrium at P* and Q*. The rent control law will be a sham. If the law is enforced, there has to be some non-price mechanism that determines who gets the apartments.

5. **Essay: The Price Mechanism (3 points total)**

"The price mechanism" refers to how a market economy allocates goods and services to buyers and inputs to production. If goods and services are allocated (sold) to those who are willing and able to pay the market equilibrium price, we say there is "price rationing" or that "the price mechanism" determines what is produced, how much, and for whom. If instead there is intervention in the market so that the price mechanism is not the way that goods and services are allocated, there is some "non-price rationing" mechanism that determines how much is produced and for whom.

Write a one-page essay in which you address these points:

- Give an example of a good or service that is allocated to buyers using the price mechanism. A good paper will not use an example that was discussed in lecture but will instead come up with a new example. Do you think society should use the price mechanism to determine for whom this good is produced? Why or why not?

- Now give an example of a good or service that is currently not allocated to buyers using the price mechanism. A good paper will not use an example that was discussed in lecture but will instead come up with a new example. What is the non-price rationing mechanism that determines for whom this product is produced? Do you think society should <u>not</u> use the price mechanism to determine for whom this product is produced? Why or why not?

There are many ways you could have gone with this essay, so we can't provide you with "this is what you should have written."

Guidelines:
a.   Did you follow the specifications? One-page essay? Max of 400 words? 1" margins? Double-spaced? 10 or 11 or 12 pt font? Your name and date & word count in the top right corner? Your essay stapled at the back of your problem set? Attached your "works cited" list (either at the end of page 1 or on a separate page)? Submitted both via bCourses & in hard copy?

If so, you remained eligible for full credit. If not, you lost 1 point right off the top.

b.   Did you choose an example of a good or service that is allocated using the price mechanism? Did you then choose a second example of a different good or service that is <u>not</u> allocated using the price mechanism? Did you describe the rationing mechanism that is used to allocate this second good or service to consumers? If so, good!

For example, who gets to purchase a semester at Cal? Is that determined by price? No. If it was, then education would go to the people willing and able to pay the most. Instead, we have an admissions process – a non-price rationing mechanism – that determines who is going to purchase a semester at Cal and who is not. Even someone with the richest parents in the world is not allowed to purchase a Cal education if they have 400 on their SATs and a 1.8 gpa in high school. (This is the crux of the Operation Varsity Blues scandal – it's not supposed to be money and wealth that directly determines who enrolls at selective universities and colleges.)

But who gets to purchase a Cal sweatshirt? Anyone who is willing and able to pay the market price. The price mechanism determines who are the buyers of Cal sweatshirts.

c.   When you answered the questions about whether or not society should use (or not use) the price mechanism for allocating the goods you chose, did you recognize that this is a normative question? Did you remember that in order to answer any normative question, you must first explicitly state what goal we are trying to achieve? Did you explicitly state a goal, and then write up your analysis in light of that goal? If so, good!