Economics 101
Spring 2019
Answers to Homework #2
Due Thursday, February 21, 2019

Directions:

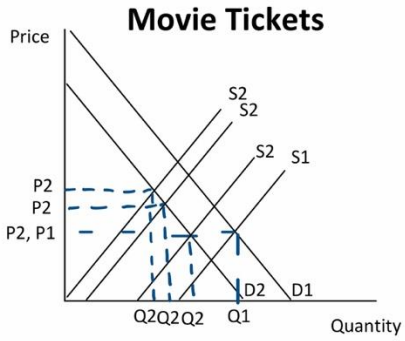
- The homework will be collected in a box labeled with your TA's name **before** the lecture.
- Please place **your name, TA name, and section number** on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Please **staple** your homework: we expect you to take care of this prior to coming to the large lecture. You do not need to turn in the homework questions, but your homework should be neat, orderly, and easy for the TAs to see the answers to each question.
- Late homework will not be accepted so make plans ahead of time.
- Show your work. Good luck!

Part I: Demand and Supply

1. For the following scenarios assume the market is in equilibrium.

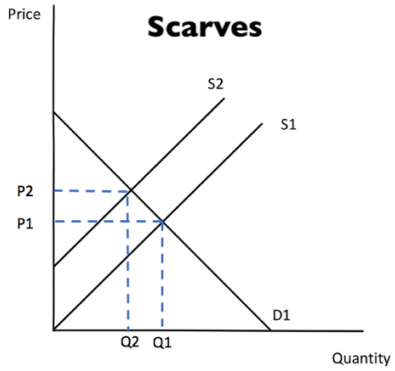
a. Assume that popcorn and movie tickets are complements. How would an increase in the price of popcorn at movie theaters and an increase in the price of ink used to print movie tickets affect the equilibrium price and the equilibrium quantity of movie tickets?

The supply curve will shift to the left as an input in the production of movie tickets (the printer ink) gets more expensive. The demand curve will shift to the left because as the price of popcorn increases fewer movie tickets will be purchased because popcorn and movie tickets are complements. This combination of shifts leads to the price of movie tickets being indeterminate and the equilibrium quantity of movie tickets will decrease. That is, relative to P1 the new equilibrium price may increase, decrease, or remain the same while relative to Q1 the new equilibrium quantity will decrease.



b. How would an increase in the price of cotton used to make scarves affect the equilibrium price and the equilibrium quantity of scarves?

This increase in the price of cotton will shift the supply curve for scarves to the left because an input in the production of scarves has become more expensive. This will lead to an increase in the equilibrium price and a decrease in the equilibrium quantity of scarves.



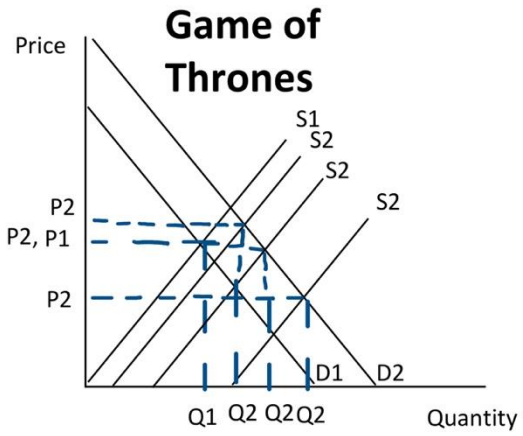
c. A new study has shown that chocolate is healthier than originally thought. How would this result affect the equilibrium price and the equilibrium quantity of chocolate?

This is a change in taste and preferences. Consumers now will demand more chocolate at every price due to this new study and therefore the demand curve will shift to the right. This will lead to an increase in the equilibrium quantity of chocolate and a decrease in the equilibrium price of chocolate relative to their initial levels.

d. Due to word of mouth Game of Thrones has become more and more popular. Furthermore, the production cost for producing a new episode of Game of Thrones has fallen since for future productions the producers can reuse old costumes and props. How will these changes affect the equilibrium price and the equilibrium quantity of episodes of Game of Thrones?

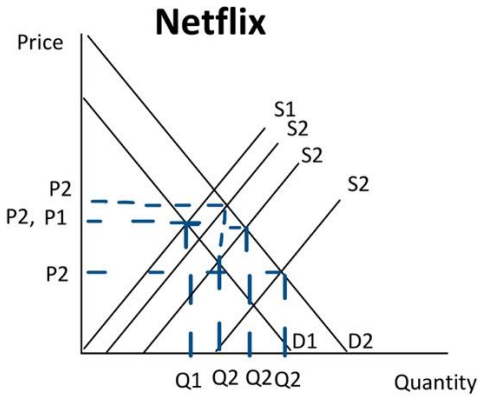
Since the production cost of producing an episode of Game of Thrones has fallen, this will cause the supply curve for this product to shift to the right. The increased popularity of Games of Thrones represents a change in tastes and preferences and will therefore shift the demand curve for this product to the right. This will lead to an increase in the equilibrium quantity of episodes of Game of Thrones relative to the initial equilibrium quantity and an indeterminate effect on the equilibrium price relative to the initial equilibrium price. That is, the new

equilibrium price for an episode of Games of Thrones may be greater, smaller, or equal to the initial equilibrium price.



e. Suppose Netflix and Hulu are complements. (If this surprises you as it did your Professor, then you might want to google "Are Hulu and Netflix complements or substitutes" and read some of the articles that appear…I found this really, really interesting! And, you might find it interesting as well!) Suppose Netflix develops a new technology that enhances their ability to produce their product. At the same time, the price of Hulu decreases significantly. How will these changes affect the equilibrium price and the equilibrium quantity of Netflix relative to the initial equilbirum price and equilibrium quantity in this market?

The new technology will allow producers to supply more Netflix streaming at every price level. This will shift the supply curve of Netflix to the right. Since the price of Hulu has decreased and these two goods are complements we can anticipate that the demand curve for Netflix will shift to the right. So, the demand curve for Netflix will shift to the right: at every price, the quantity demanded of Netflix streaming services will increase. This will lead the equilibrium price of Netflix to be indeterminate and the equilibrium quantity to increase relative to the initial equilibrium levels.



2. Consider the market for Kobe Beef. This market can be described by the following information. The quantity supplied of Kobe Beef is always equal to three times the price per unit of Kobe Beef. The quantity of Kobe Beef demanded decreases by one unit of Kobe Beef every time the price per unit of Kobe beef increases by one dollar. When the price of Kobe Beef is equal to one dollar, the quantity demanded of Kobe beef is equal to 7 units of Kobe Beef. Both the demand curve and the supply curve in the market for Kobe beef are linear.

a. What is the equation for the demand curve for Kobe Beef? In your equation use Q as the symbol for the quantity of Kobe Beef units and P as the price per unit of Kobe Beef.

Q = 8 - P or P = 8 - Q

b. What is the equation for the supply curve for Kobe Beef? In your equation use Q as the symbol for the quantity of Kobe Beef units and P as the price per unit of Kobe Beef.

3P = Q or P = (1/3) * Q

c. Find the equilibrium price and quantity, (Q, P), in the market for Kobe Beef. To find the equilibrium, you have to find where the supply and demand curves intersect. In this case you need to set them equal to each other to solve for P.

From the supply equation we know Q = 8 - P and from the demand equation we know 3P = Q. Setting these two equations equal to one another:
8 – P = 3P
8 = 4P
2 = P
That is, the equilibrium price per unit of Kobe Beef is $2.
Plugging in this value for the equilibrium price into either the supply or demand curve we get Q = 6 units of Kobe Beef. Here's the work:
Supply: 3(2) = quantity supplied
Demand: 8 – 2 = quantity demanded
The equilibrium quantity is therefore 6 units of Kobe Beef and the equilibrium price is $2 per unit of Kobe Beef. (Q, P) = (6, $2).

Part II: Price Controls

3. Consider the market for apartment rentals in Madison. The market is described by the following supply and demand system of equations where P is the price of an apartment (the monthly leasing fee let's assume) and Q is the quantity of apartments:

Demand Curve for Apartments: P = 100 – 2Qd
Supply Curve for Apartments: P = 3Qs + 50

a. What is the equilibrium price and quantity in the market for apartment rentals?

100 - 2Q = 3Q + 50
50 = 5Q
Q = 10
So P = 100 – 2(10) = 80

b. Suppose the government tries to control the rent prices through a price ceiling of $56. Given this price ceiling and holding everything else constant:

i. What is the new quantity demanded and quantity supplied in this market with the implementation of this price ceiling?
ii. Is there a shortage or a surplus in this market when the price ceiling is implemented? Quantify the size of the shortage or surplus if it exists with the implementation of this price ceiling.
iii. What is the deadweight loss due to the implementation of this price ceiling?
iv. Provide a well labeled and complete graph that illustrates this price ceiling, the quantity demanded with this price ceiling, the quantity supplied with this price ceiling, and the deadweight loss due to the implementation of this price ceiling.

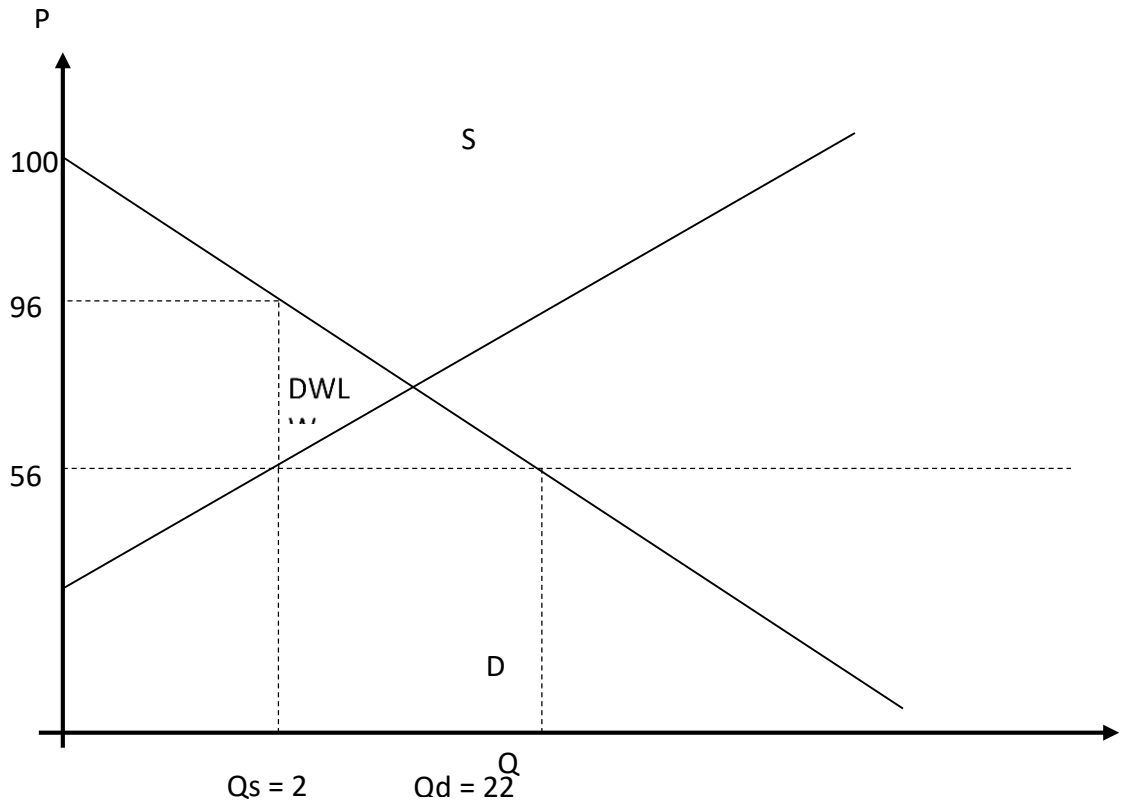
i. To find the quantity demanded at the price ceiling of $56:
56 = 100 - 2Qd
2Qd = 44
Qd = 22 units

To find the quantity supplied at the price ceiling of $56:
56 = 3Qs + 50
Qs = 2 units

ii. Since Qd > Qs, there is a shortage once the price ceiling is implemented. There is a shortage of 20 units in this market when the price ceiling of $56 per unit is implemented.

iii. DWL = (1/2)((96 - 56)(10 - 2) = (1/2)(40)(8) = $160

iv.



Now, suppose a big tech company called Legendary moves to Madison. Assume that with the inflow of new employees from Legendary, the new market demand for apartment rentals is given by the following equation:

New Market Demand for Apartments: P = 200 – 2Qd

c. At the original price ceiling of $56 and holding everything else constant:

i. What is the new quantity demanded and quantity supplied in this market with the implementation of this price ceiling?
ii. Is there a shortage or a surplus in this market when the price ceiling is implemented? Quantify the size of the shortage or surplus if it exists with the implementation of this price ceiling.
iii. What is the deadweight loss due to the implementation of this price ceiling?
iv. Provide a well labeled and complete graph that illustrates this price ceiling, the quantity demanded with this price ceiling, the quantity supplied with this price ceiling, and the deadweight loss due to the implementation of this price ceiling.

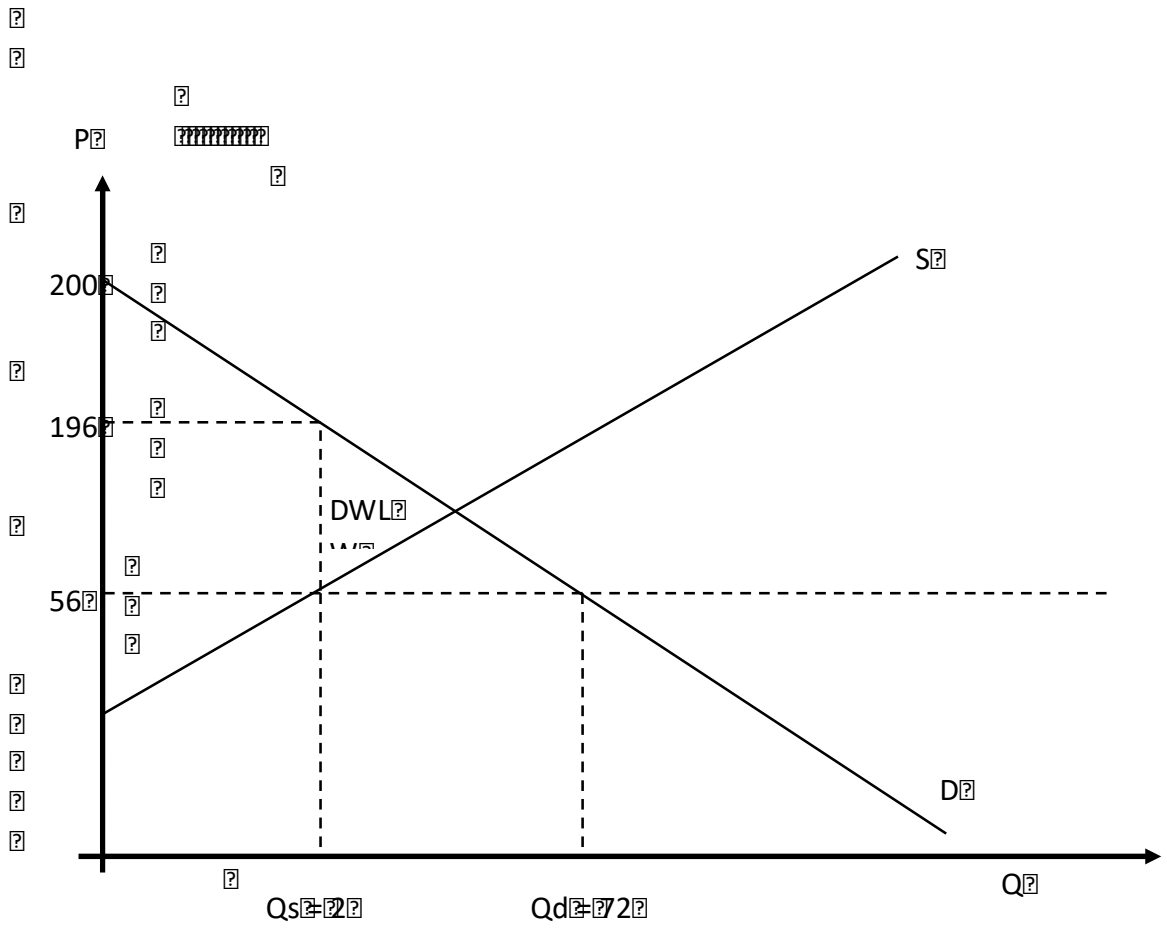
i. To find the quantity demanded at the price ceiling of $56:
56 = 200 – 2Qd
2Qd = 144
Qd = 72 units

To find the quantity supplied at the price ceiling of $56:
56 = 3Qs + 50
3Qs = 6
Qs = 2 units

ii. Since Qd > Qs, there is a shortage once the price ceiling is implemented. There is a shortage of 70 units in this market when the price ceiling of $56 per unit is implemented. So, there is an even larger shortage given this new demand curve and the implementation of this price ceiling.

iii. DWL = (1/2)(196 – 56)(30 – 2) = (1/2)(140)(28) = $1960

iv.



4. Consider the market for oranges in a small, closed economy. The domestic demand curve and the domestic supply curve for oranges are given by the following equations where P is the price per orange in dollars and Q is the quantity of oranges:

Domestic Demand Curve for Oranges: P = 10 - 0.1Q
Domestic Supply Curve for Oranges: P = 2 + 0.4Q

a. Given the above information and holding everything else constant, what is the equilibrium quantity and price in this market for oranges?

In the equilibrium, we have $p_s = p_d$. Set 10 - 0.1Q = 2 + 0.4Q and then solve for Q:
Q =16 oranges
Plug this quantity into either the demand curve or the supply curve to find the equilibrium price:
P = 10 – 0.1(16) = $8.40 per orange
Or, P = 2 + 0.4(16) = $8.40 per orange

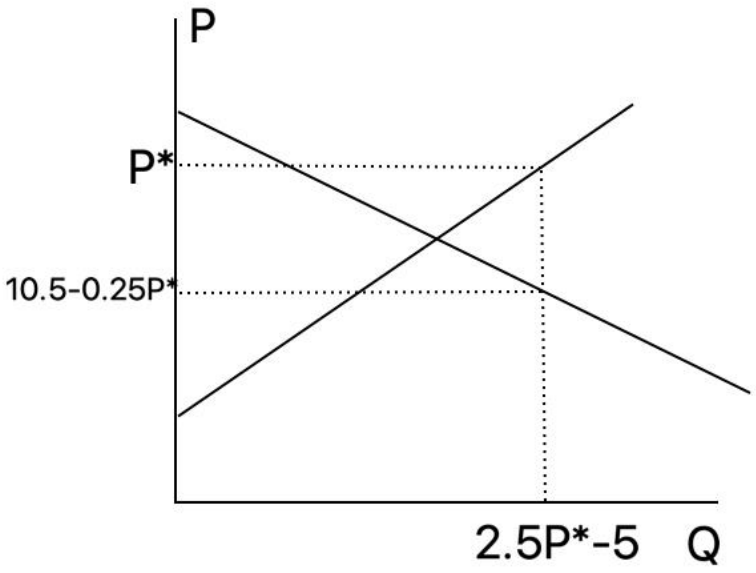
b. Suppose the government decides to implement a price support program with a price floor of $9.60 per orange. The government agrees to buy any surplus in this market due to the implementation of this price floor. Given this program and the above information:

i. How many units of oranges will the government have to buy given the implementation of this price support program?
ii. What is the cost to the government of this price support program? Assume that the storage costs to the government are $0.50 per orange.

i. When the government implements a price floor of $9.60 per orange and agrees to buy any surplus oranges that arise out of the implementation of this price floor, the government will find that the quantity of oranges demanded at a price of $9.60 per orange will be 4 oranges while the quantity of oranges supplied at a price of $9.60 per orange will be 19 oranges. The government will buy the surplus at this price: the government will buy 19 – 4 or 15 oranges with the implementation of this price floor.

ii. The cost to the government of this price support program will be equal to the direct cost of buying the surplus at the price floor price plus the cost of storing the product. Cost to the government = (9.60)(15) + (0.50)(15) = 144 + 7.50 = $151.5.

c. Now suppose that instead of a price support program in this market that the government decides to implement a price guarantee program in this market. Recall that the price guarantee program guarantees producers a price for their product with the government paying a subsidy per unit that is equal to the guaranteed price minus the price that the producers sell the product for in the market. Suppose the government has a limited budget of $28.50. Given this information and holding everything else constant, what is the maximum price that the government can guarantee in this market?



Suppose the maximum price is P*. At P*, we have P* = 2 + (0.4)Qs. Rearranging this equation in x-intercept form we have:

$Q_S = 2.5P^* - 5.$

The corresponding price level given this price guarantee is:

$P_d = 10 - 0.1 * (2.5P^* - 5) = 10.5 - 0.25P^*.$

Therefore, the total cost of the program is:

$Q_s(P^* - P_d) = (2.5P^* - 5)(1.25P^* - 10.5) = 28.50$

We can solve this equation but it does take some work!

(2.5P*)(1.25P*) – (5)(1.25P*) – (10.5)(2.5P*) + (5)(10.5) = 28.50

(5/2P*)(5/4P*) – (5)(1.25P*) – (10.5)(2.5P*) + (5)(10.5) = 28.50

$(25/8)P^{*2}$ – 6.25P* - 26.25P* + 52.50 = 28.50

$(25/8)P^{*2}$ – 32.5P* + 24 = 0

$(25)P^{*2}$ – (65)(4)P* + 8(24) = 0

$(25)P^{*2}$ – (260)P* + 192 = 0

(5P* - 4)(5P* - 48) = 0

5P* = 4

P* = $0.80

Or,

5P* = 48

P* = 48/5 = $9.60

P*=$0.80 doesn't make sense as it is less than the equilibrium price.

Since $9.60 > $0.80 then $9.60 must be the maximum price that can be guaranteed given the government's budget of $28.50.

Part III: Excise Taxes

5. Consider the market for winter hats. Demand and Supply are given by the following equations, where quantity, Q, is measured in number of hats and the price, P, is measured in dollars:

Demand: $P = 50 - \frac{1}{2}Q_D$

Supply: $P = 20 + \frac{1}{2}Q_s$

a. Find the equilibrium price and quantity in the market for winter hats. Demonstrate the equilibrium graphically.

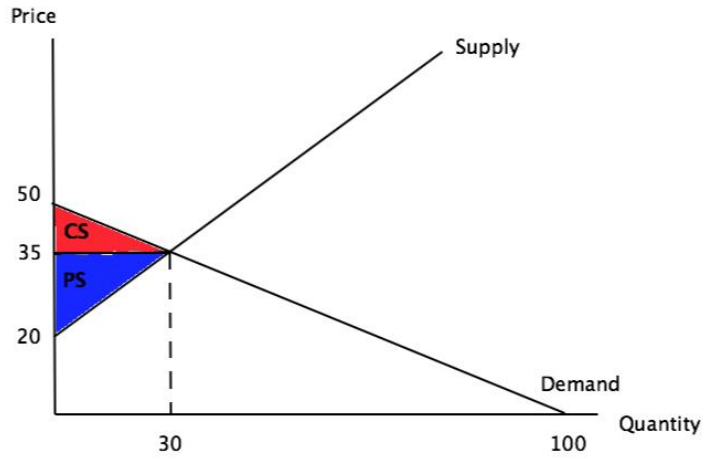
In order to find the equilibrium in a given market, find the point at which demand and supply are equal.

$50 - \frac{1}{2}Q = 20 + \frac{1}{2}Q$

$50 - 20 = Q$

$Q = 30$ units of winter hats

Then, $P = 50 - \frac{1}{2} \times 30 = 50 - 15 = \$35\ per\ hat$



b. Find consumer surplus and producer surplus in the market for winter hats.

Recall that consumer surplus is the area below the demand curve and above the equilibrium price, and producer surplus is the area above the supply curve and below the equilibrium price.

Consumer Surplus (CS) = $\frac{1}{2} \times (50 - 35) \times 30 = \$225$

Producer Surplus (PS) = $\frac{1}{2} \times (35 - 20) \times 30 = \$225$

c. Suppose the government decides to impose an excise tax on producers. More precisely, they impose an excise tax of $10 per unit of winter hats. Find the new supply equation.

When the government imposes an excise tax on producers, the supply curve shifts upwards by the amount of the tax. Therefore, the new supply equation is given by

$S_{new}: P = 20 + \frac{1}{2}Q_s + 10 = 30 + \frac{1}{2}Q_s$

d. Find the new equilibrium price and quantity in the market for winter hats. Demonstrate this new equilibrium graphically.

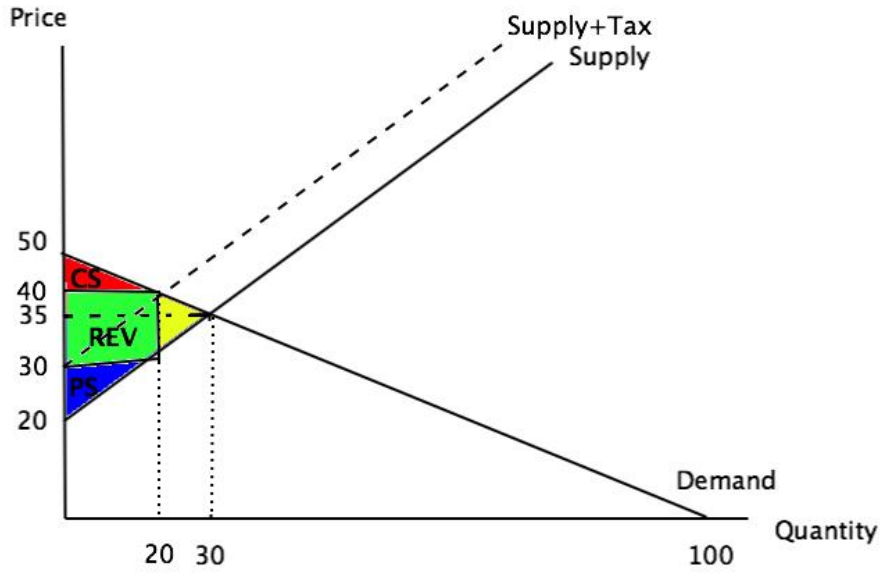
In order to find the new equilibrium point in a given market, find the point at which the original demand curve and the new supply curve are equal.

$50 - \frac{1}{2}Q = 30 + \frac{1}{2}Q$

$50 - 30 = Q$

$Q = 20\ hats$

Then, $P = 50 - \frac{1}{2} \times 20 = \$40\ per\ hat$



e. Find the new consumer surplus and producer surplus in the market for winter hats with the specified excise tax.

Consumer Surplus (CS) = $\frac{1}{2} \times (50 - 40) \times 20 = \$100$

Producer Surplus (PS) = $\frac{1}{2} \times (30 - 20) \times 20 = \$100$

f. Find the tax revenue that the government gets from imposing this excise tax, as well as the consumer tax incidence and the producer tax incidence of this excise tax.

Tax Revenue (REV) = $10 \times\ 20 = \$200$

Consumer Tax Incidence (CTI) $= (40 - 35) \times 20 = \$100$
Producer Tax Incidence (PTI) $= (35 - 30) \times 20 = \$100$

g. Find the deadweight loss from imposing the tax.

Deadweight loss is the yellow area on the graph above.
Deadweight loss (DWL) $= \frac{1}{2} \times (40 - 30) \times (30 - 20) = \$50$

Part IV: Market Demand and Market Supply

6. Suppose there are two consumers in the market for bagels and their individual demand curves are given by the following equations where P is the price per bagel and Q is the quantity of bagels:

Glenn's demand for bagels: P = 40 – 2Q
Betsy's demand for bagels: P = 30 – (1/2)Q

a. Draw two different graphs: in the first graph draw Glenn's demand for bagels and in the second graph draw Betsy's demand for bagels. Make sure you label all axes and all intercepts clearly.
b. In a third graph draw the market demand curve for bagels. Make sure you label this demand curve carefully and completely; if there is a "kink" point label the coordinates of this point.
c. Based on your graph in (b), write the equation(s) for the market demand curve. Provide a range of price for any demand curve equation you provide. When writing these equations, use the slope-intercept form and also retain fractions rather than decimals if necessary.

Suppose that Paul, a third consumer, enters this market and has the following demand for bagels:

Paul's demand for bagels: P = 10 – Q

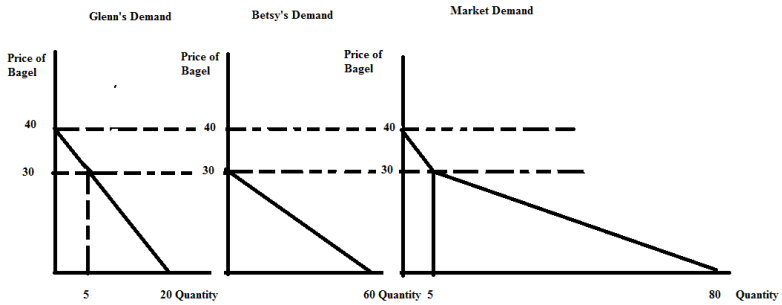
d. Draw a fourth graph that represents the market demand curve for bagels when the market includes Glenn, Betsy, and Paul. Label all intercepts, all axes, and all "kink" points clearly and carefully.
e. Based on your graph in (d), write the equation(s) for the market demand curve. Provide a range of prices for any demand curve equation you provide. When writing these equations, use the slope-intercept form and also retain fractions rather than decimals when necessary. Check that your answers are correct and that your math is accurate!!
f. Suppose that the market supply curve is given by the following equation:

Market Supply Curve: P = 18 + Q

Given this information and your answer in (e) find the equilibrium price and quantity in this market and then determine how many units of the good Glenn, Betsy and Paul will each consume.

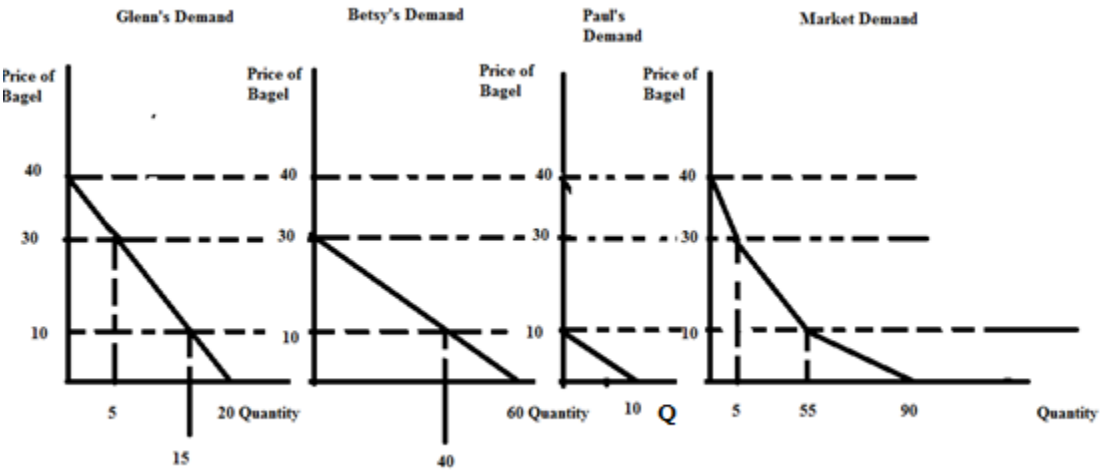
Answer:

a. and b.



c. There are two segments to the market demand curve:
i) For prices greater than or equal to 30, the market demand curve can be written as P = 40 – 2Q. That is, the market demand curve if the price is greater than or equal to 30 is simply Glenn's demand curve.
ii) For prices less than or equal to 30, the market demand curve is a harder equation to write. Here is the explanation: you know that the points (5, 30) and (80, 0) are on this line and you also can compute the slope = rise/run = -30/75 = -2/5. So, then take the slope-intercept form: y = mx + b and start plugging in what you know:
y = mx + b
P = (-2/5)Q + b and (Q, P) = (5, 30) is on the line
30 = (-2/5)(5) + b or b = 32
The equation for the lower segment of the market demand curve is therefore: P = (-2/5)Q + 32

d.



e. The market demand curve has three segments now:
i) For prices greater than or equal to 30, the market demand curve can be written as P = 40 – 2Q. That is, the market demand curve if the price is greater than or equal to 30 is simply Glenn's demand curve.

ii) For prices less than or equal to 30 and greater than or equal to 10, the market demand curve is a harder equation to write. Here is the explanation: you know that the points (5, 30) and (55, 10) are on this line and you also can compute the slope = rise/run = -20/50 = -2/5. So, then take the slope-intercept form: y = mx + b and start plugging in what you know:
y = mx + b
P = (-2/5)Q + b and (Q, P) = (5, 30) is on the line
30 = (-2/5)(5) + b or b = 32
The equation for the middle segment of the market demand curve is therefore: P = (-2/5)Q + 32
NOTE: THAT THE EQUATIONS FOR THESE FIRST TWO SEGMENTS ARE THE SAME AS WHAT YOU FOUND IN (C), ALTHOUGH THE RANGE HAS CHANGED FOR THE SECOND EQUATION.
iii) We now just need to find the equation for the lowest segment of the demand curve: we know that the points (55, 10) and (90, 0) sit on this segment. To make sure you see this: hold price constant at 10 and ask what quantity Glenn, Betsy and Paul will demand: Glenn will want 15 units (use his demand curve to get this quantity at this price), Betsy will want 40 units (use her demand curve to get this quantity at this price), and Paul will demand zero units. Then similar work to the work you did for answer (c) will give P = (180/7) – (2/7)Q for prices equal to or less than 10. This equation seems so strange that I wanted to check my work:

For (Q, P) = (90, 0) is this a true equation? Yes,
P = (180/7) – (2/7)Q
0 = (180/7) – (2/7)(90)

For (Q, P) = (55, 10) is this a true equation? Yes,
P = (180/7) – (2/7)Q
10 = (180/7) – (2/7)(55)
10 = 70/7!
f. To solve this problem you first need to determine which segment of the demand curve you will be using. You know some kink points: (Q, P) = (5, 30) and (55, 10) and you know the supply curve P = 18 + Q. Think about this for a moment: plug in Q = 5 into the supply curve and you get P = 18 + 5 = 23 and that value provides a point (5, 23) that lies below (5, 30). Plug in Q = 55 and you get P = 18 + 55 = 73 and that value provides a point (55, 73) that lies above (55, 10). That means that the supply curve must intersect the middle segment of the market demand curve. So:
D: P = 32 – (2/5)Q
S: P = 18 + Q
18 + Q = 32 – (2/5)Q
(7/5)Q = 14
Q = 10 units
P = 18 + Q = 18 + 10 = $28
Or, P = 32 – (2/5)(10) = $28

When the price is $28 per unit:
Glenn's consumption when P = $28 per bagel:
28 = 40 – 2Qg
2Qg = 12

Qg is 6 bagels or Glenn will consume 6 bagels when the price is $28 per bagel.

Betsy's consumption when P = $28 per bagel:
28 = 30 – (1/2)(Qb)
(1/2)Qb = 2
Qb = 4 bagels or Betsy will consume 4 bagels when the price is $28 per bagel.

Paul will not consume any bagels when the price is $28 per bagel. Paul does not demand any bagels once the price is equal to or greater than $10 per bagel.

7. Suppose that there are two firms that produce bagels and their individual firm supply curves are given as follows where P is the price per bagel and Q is the quantity of bagels:

Supply curve for Firm A: P = 1 + (2/83)Q
Supply curve for Firm B: P = 1 + (2/83)Q

HINT: In this problem you will find it helpful to retain your fractions as fractions. You will also find it helpful to use a calculator for some of the multiplication and division that is required. Do NOT despair-you can do this set of problems!

a. If there are just these two firms in the market, what is the market supply curve? Show how you found this answer.

b. Given the market demand curve you found in question 6e, and this new information about the firms that produce bagels, calculate the equilibrium price and quantity in the market for bagels.

c. Given your answer in (b), how many bagels will Glenn consume? How many bagels will Betsy consume? How many bagels will Paul consume? Show how you found your answer.

Answer:

a. To find the market supply curve we need to add the two individual supply curves together horizontally. We know that when the price is equal to 1, neither firm produces any bagels. Hence, the point (0, 1) is on each firm's supply curve, but it is also on the market supply curve. To find the market supply curve we need to find one more point on this curve: so, pick a quantity and then compute the price that the firm will sell this many bagels for. So, for example if the quantity is 83 bagels produced by Firm A, we know that firm A will be willing to sell those 83 bagels for $3 per bagel. That implies, since the two firms have identical supply curves, that when 166 bagels are supplied by the two firms they will sell these bagels for $3 per bagel. Thus, we have (166, 3) as another point on our market supply curve. [Note: picking a "good quantity" for this analysis makes the analysis easier to do.] So, now you have two points on the market supply curve: (Q, P) = (0, 1) and (166, 3). Use these two points to write the equation:
Y = mX + b
P = (1/83)Q + b
Use one of the known points to find the value of the y-intercept, b:
1 = (1/83)(0) + b
b = 1
Equation for the market supply curve in y-intercept form: P = 1 + (1/83)Q

Alternatively, you could get the market supply curve by first writing the two firm supply curves in x-intercept form and then adding these two equations together to find the total quantity supplied in the market. You want the equations in x-intercept form since you are summing these equations horizontally. So, using this method you have:
Supply of Firm A: Qa = (P – 1)(83/2)
Supply of Firm B: Qb = (P – 1)(83/2)
Total Supplied by the two firms = Qt = Qa + Qb
Qt = 2[(P – 1)(83/2)] = (P – 1)(83/2) + (P – 1)(83/2)
Qt = (P – 1)(83)
Qt = (83)P – (83)…this is the market supply curve in X-intercept form
P = (1/83)Qt + 1…this is the market supply curve in Y-intercept form

b. Here the issue is trying to decide where the market supply curve intersects the market demand curve. We know that from 6e there are three segments to the market demand curve. Which is the right segment to use? One way to think about this it to consider each of the kink points on that demand curve relative to the supply curve:
i) Kink point (5, 30) sits on the market demand curve. If the quantity is 30, what price do you get from the market supply curve? So, P = 1 + (1/83)(30) = a number that is smaller than 2 (no need to do the math calculation if you are comfortable with the underlying logic). This tells us that the supply curve must cross the market demand curve below this first kink point.
ii) Kink point (55, 10) sits on the market demand curve. If the quantity is 55, what price do you get from the market supply curve? So, P = 1 + (1/83)(55) = a number that is smaller than 2 (no need to do the math calculation if you are comfortable with the underlying logic). This tells us that the supply curve must cross the market demand curve below this second kink point.
The logic of the above "thought experiment" tells us that we need to use the market demand equation for the range of prices between 0 and 10 to find the equilibrium price and quantity in this market. Thus, the market demand curve segment we need is P = 180/7 – (2/7)Q and the market supply equation is P = 1 + (1/83)Q. Using these two equations we can find that the equilibrium quantity is 83 bagels and the equilibrium price is $2 per bagel. Here's the work:
1 + (1/83)Q = 180/7 – (2/7)Q
(83)(7)[1 + (1/83)Q] = (83)(7)[180/7 – (2/7)Q] …Note: take a moment and examine what I am doing to make the calculation easier for me.
581 + 7Q = 14940 – 166Q
173Q = 14359
Q = 83 bagels
Then, use this quantity in either the market demand or market supply equation to find the equilibrium price:
Market Supply: P = 1 + (1/83)(83) = $2 per bagel
Market Demand: P = (180/7) – (2/7)(83)
P = (180/7) – (166/7) = 14/7 = $2 per bagel…Note: that keeping this as fractions makes some of this math a bit easier than it might seem!

c. Given Glenn's demand is P = 40 - 2Q and the equilibrium price in the bagel market is $2, we can calculate Glenn's number of bagels as 2 = 40 – 2Q or Qglenn = 19 bagels.

Given Betsy's demand is P = 30 – (1/2)Q and the equilibrium price in the bagel market is $2, we can calculate Betsy's number of bagels as 2 = 30 – (1/2)Q or QBetsy = 56 bagels. (She does love her bagels.

Given Paul's demand is P = 10 - Q and the equilibrium price in the bagel market is $2, we can calculate Paul's number of bagels as 2 = 10 - Q or Qpaul = 8 bagels.

Notice: that the sum of bagels consumed by Glenn, Betsy and Paul does equal the equilibrium quantity of bagels provided by the market: 19 + 56 + 8 does equal the 83 bagels that were provided.