Consumers, Producers, and the Efficiency of Markets

Chapter 7

Hussain Hadah
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Introduction

The Invisible Hand

- So far in this class, our analysis has been *positive* (what is) rather than *normative* (what should be)
- In this chapter we will discuss *welfare economics*
- *Welfare economics* is the study of how the allocation of resources affects economic well-being
- We will look at how buyers and sellers benefit from engaging in market transactions
- We will also examine how society benefits
- We will conclude that in any market, the total benefits received by buyers and sellers are maximized at equilibrium

Consumer Surplus

Willingness to pay

- *Willingness to pay* is the maximum amount a buyer is willing to giveup in return of a good or a service
- Buyers will enter a transaction if the price of a good is lower than their *willingness to pay*
- Buyers will refuse to participate in a transaction if the price of a good is higher than their *willingness to pay*
- Buyers will be indifferent about buying the good if the price is equal to their *willingness to pay* (they are equally as happy buying the good or keeping the money)

Example

- You have a ball signed by James Harden
- You don't want to keep the ball because Harden left the Rockets
- You start an auction on eBay
- 4 people are willing to buy the ball
- The max willingness to pay for each potential buyer is presented in the next table
- You start the bidding at $10
- What will happen?

Max willingness to pay for each buyer

Table 1 **Four Possible Buyers' Willingness to Pay**

Buyer	Willingness to Pay
Taylor	$100
Carrie	80
Rihanna	70
Gaga	50

- The bidding begins at $10 which is lower than the max willingness to pay for all potential buyers
- The price of the ball will rise quickly
- Gaga will keep raising her bids until she reaches $50
- Rihanna will keep raising her bids until she reaches $70
- Carrie will keep raising her bids until she reaches $80

Max willingness to pay for each buyer (cont.)

Table 1 **Four Possible Buyers' Willingness to Pay**

Buyer	Willingness to Pay
Taylor	$100
Carrie	80
Rihanna	70
Gaga	50

- Now, the price of the ball is $80, which is still less than Taylor's max
- So Taylor will put an offer at $80, that's higher than the max of the three other bidders
- The last bid would be $80, and that will be the price of the ball
- The ball went to the person that values it the most
- Taylor was willing to pay $100, but got the ball at a bargain at $80

Max willingness to pay for each buyer (cont.)

Table 1 **Four Possible Buyers' Willingness to Pay**

Buyer	Willingness to Pay
Taylor	$100
Carrie	80
Rihanna	70
Gaga	50

- The difference between the max willingness to pay and the price a consumer paid is called consumer surplus
- Taylor's consumer surplus is $20

Same example but there are 3 balls

- Assume the three balls will be sold at the same price
- No one is interested in buying more than one
- The bidding will stop when Rihanna, Carrie and Taylor bid $50
- Taylor's consumer surplus is $50
- Carrie's consumer surplus is $30
- Rihanna's consumer surplus is $20
- Total consumer surplus in the market is $100

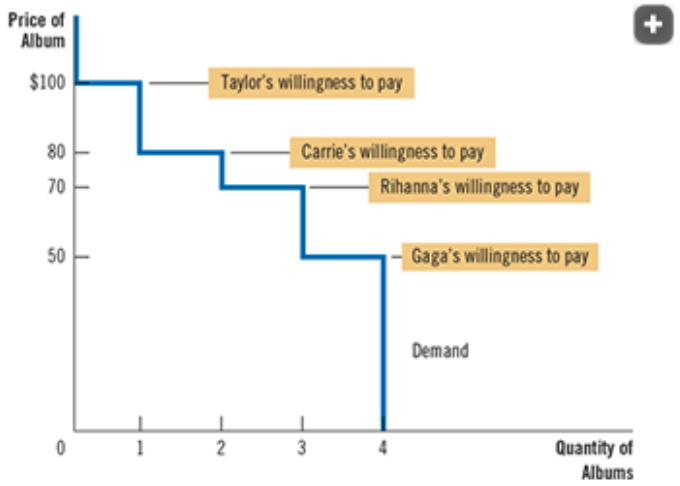
Measuring consumer surplus

How to measure consumer surplus using the demand curve?

Figure 1 **The Demand Schedule and the Demand Curve**

The table shows the demand schedule for the buyers (listed in Table 1) of the mint-condition copy of Elvis Presley's first album. The graph shows the corresponding demand curve. Note that the height of the demand curve reflects the buyers' willingness to pay.

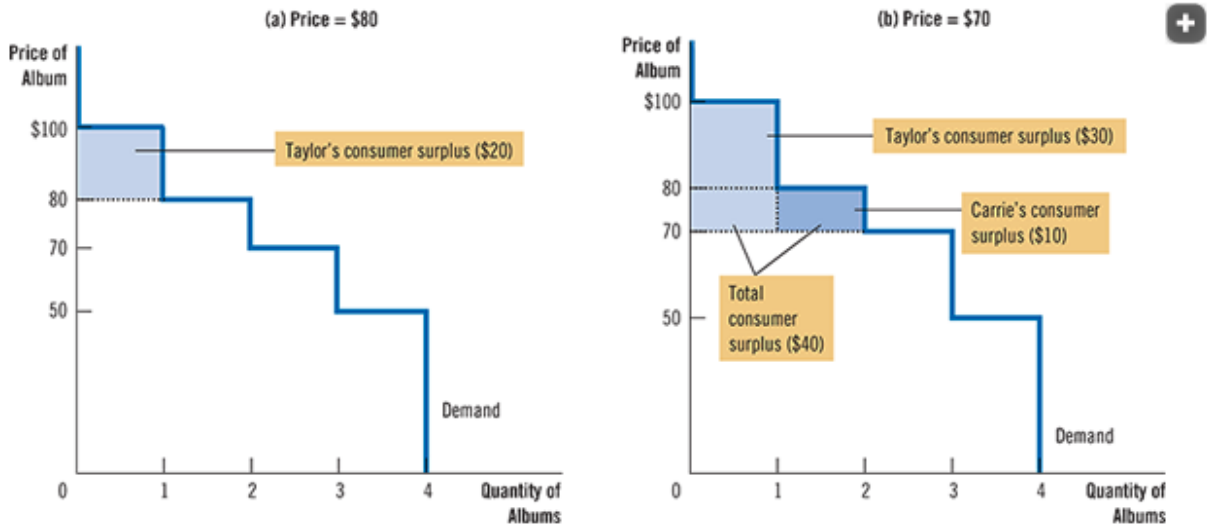
Price	Buyers	Quantity Demanded
More than $100	None	0
$80 to $100	Taylor	1
$70 to $80	Taylor, Carrie	2
$50 to $70	Taylor, Carrie, Rihanna	3
$50 or less	Taylor, Carrie, Rihanna, Gaga	4



Consumer surplus when the price is $80 and $70

Figure 2 **Measuring Consumer Surplus with the Demand Curve**

In panel (a), the price of the good is $80 and the consumer surplus is $20. In panel (b), the price of the good is $70 and the consumer surplus is $40.

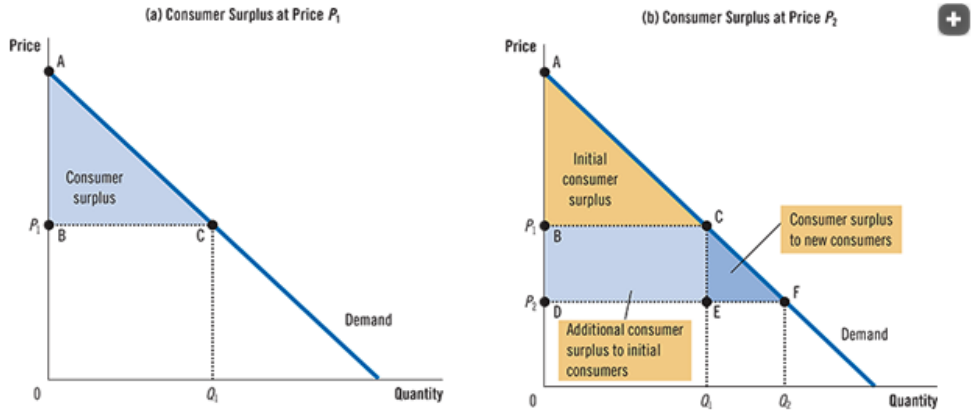


Prices and consumer surplus

Consumers always want to have lower prices because it increases their consumer surplus

Figure 3 **How Price Affects Consumer Surplus**

In panel (a), the price is P_1, the quantity demanded is Q_1, and consumer surplus equals the area of the triangle ABC. When the price falls from P_1 to P_2, as in panel (b), the quantity demanded rises from Q_1 to Q_2 and the consumer surplus rises to the area of the triangle ADF. The increase in consumer surplus (area BCFD) occurs in part because existing consumers now pay less (area BCED) and in part because new consumers enter the market at the lower price (area CEF).



What does consumer surplus measure?

Can consumer surplus be a good measure of economic well-being?

If Congress is trying to pass a law, should policymakers consider consumer surplus?

Since consumer surplus is the amount that buyers perceive they are benefiting from, it is a good measure of well-being in many cases

A case where consumer surplus is not a good measure of well-being is the market for illicit drugs. In this case, society does not perceive consumer surplus as a measure of well-being

Producer Surplus

Cost and willingness to sell

- Let's say you want to paint your house
- There are four sellers for this service: Vincent, Claude, Pablo and Andy
- Each painter will work if the offer was attractive to them
- A painter will take a job if the offer exceeds the cost of the job
- *Willingness to sell* is the lowest amount a person is willing to receive for a good or a service

The painters' *Willingness to sell*

Table 2 **The Costs of Four Possible Sellers**

Seller	Cost
Vincent	$900
Claude	800
Pablo	600
Andy	500

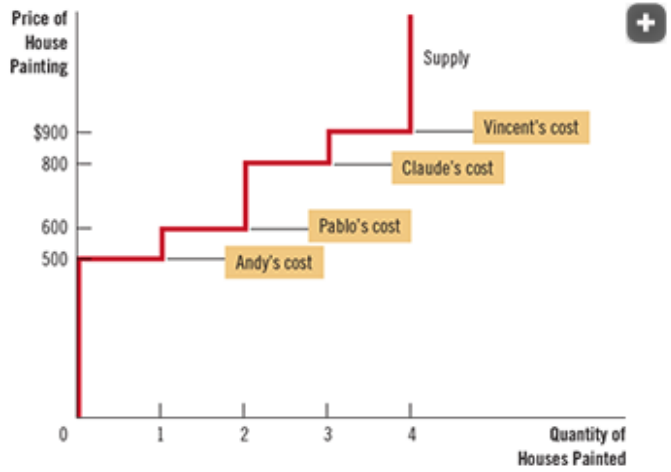
- The price of the service will keep falling until $600
- At $600, Vincent, Claude and Pablo will not take the job
- At $600, Andy will be happy to take the job
- Andy's *producer surplus* is $100

Using the supply curve to measure producer surplus

Figure 4 **The Supply Schedule and the Supply Curve**

The table shows the supply schedule for the sellers (listed in Table 2) of painting services. The graph shows the corresponding supply curve. Note that the height of the supply curve reflects the sellers' costs.

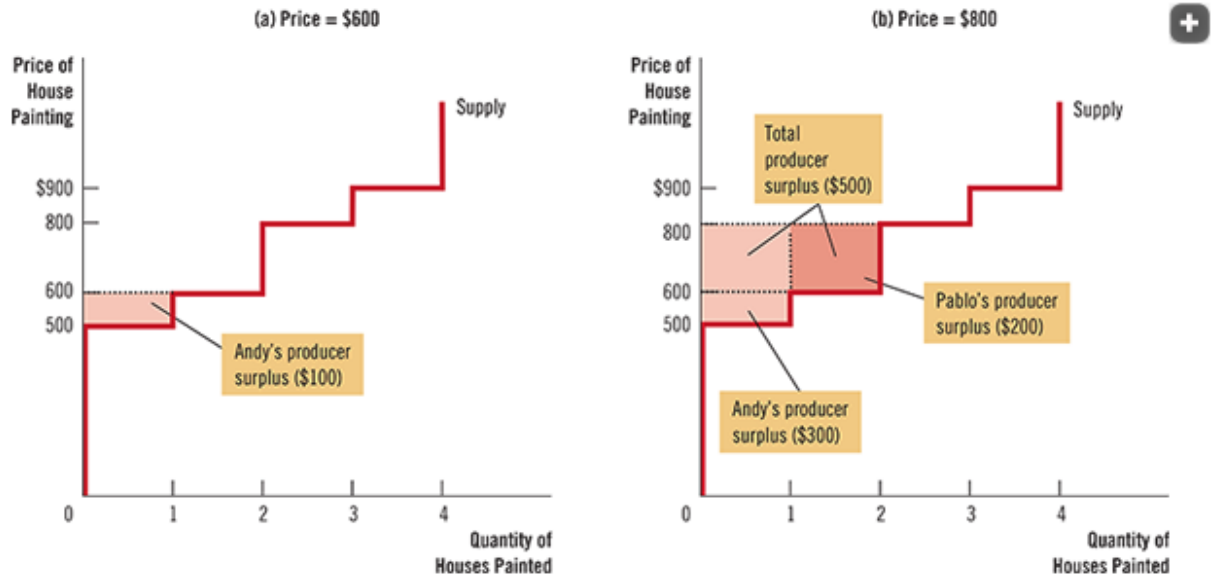
Price	Sellers	Quantity Supplied
$900 or more	Vincent, Claude, Pablo, Andy	4
$800 to $900	Claude, Pablo, Andy	3
$600 to $800	Pablo, Andy	2
$500 to $600	Andy	1
Less than $500	None	0



Producer surplus at $600 & $800

Figure 5 **Measuring Producer Surplus with the Supply Curve**

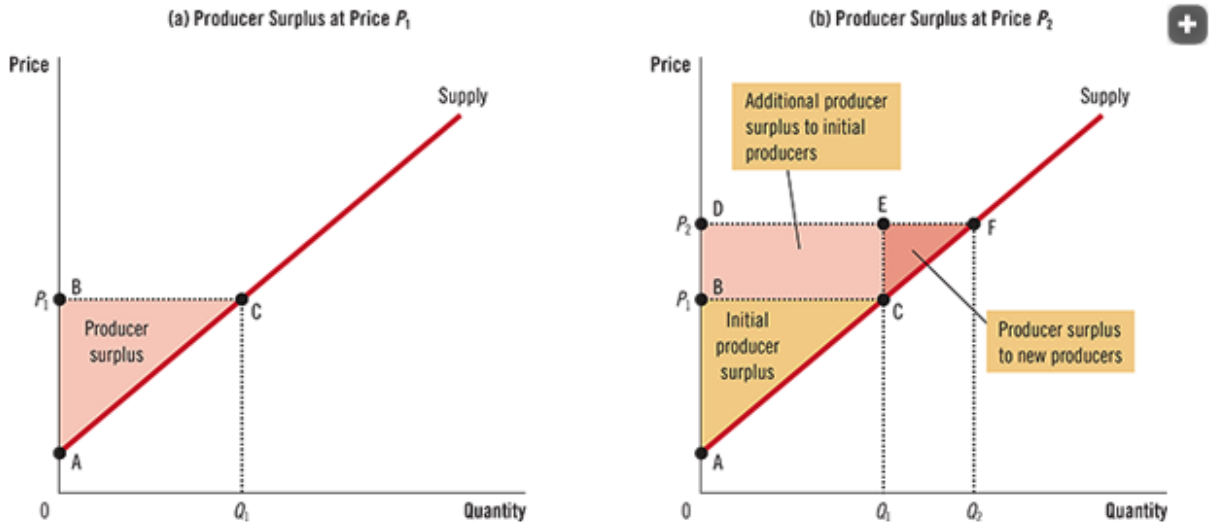
In panel (a), the price of the good is $600 and the producer surplus is $100. In panel (b), the price of the good is $800 and the producer surplus is $500.



Prices & producer surplus

Figure 6 **How Price Affects Producer Surplus**

In panel (a), the price is P_1, the quantity supplied is Q_1, and producer surplus equals the area of the triangle ABC. When the price rises from P_1 to P_2, as in panel (b), the quantity supplied rises from Q_1 to Q_2 and the producer surplus rises to the area of the triangle ADF. The increase in producer surplus (area BCFD) occurs in part because existing producers now receive more (area BCED) and in part because new producers enter the market at the higher price (area CEF).



Market Efficiency

The benevolent social planner

- To understand the market outcomes, let's say there is a benevolent social planner
- The benevolent social planner knows everything, powerful and well-intentioned dictator (What Plato called the philosopher king)
- The planner wants to maximize the well-being of society
- Should she leave buyers and sellers at the market equilibrium?
- Should she increase the economic well-being by altering the market?
- To answer the two questions we need a measure of societal economic well-being

The benevolent social planner (cont.)

- One such measure is the *total surplus*

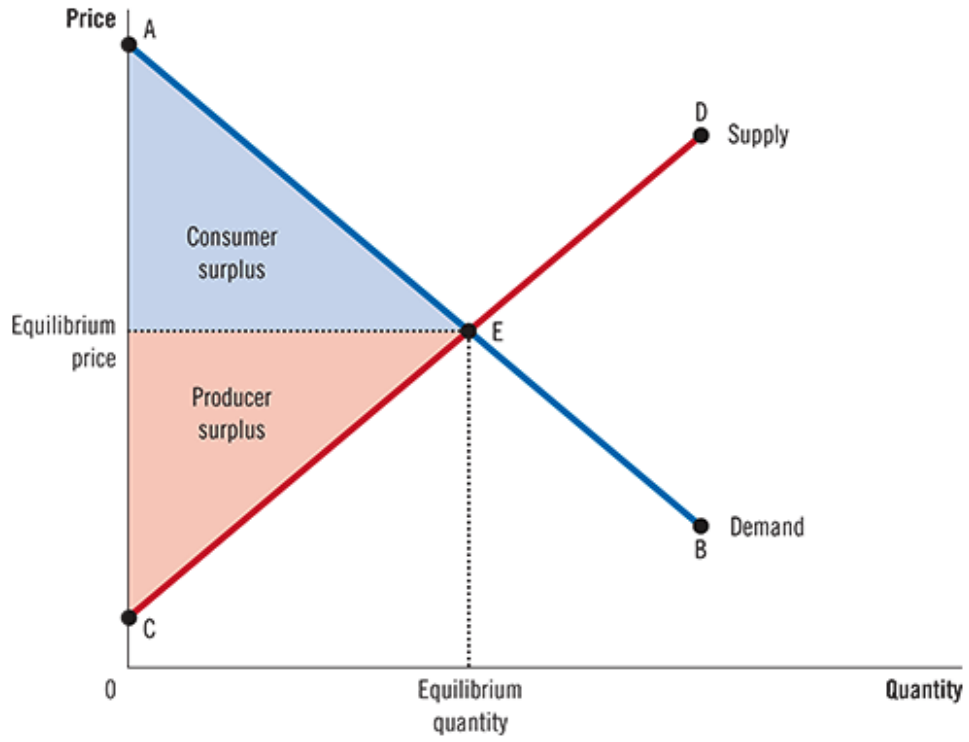
$$\begin{aligned}\text{Consumer Surplus} &= \text{Value to buyers} - \text{amount paid by buyers}\\ \text{Producer Surplus} &= \text{Amount received by sellers} - \text{Cost to sellers}\\ \text{Total Surplus} &= \text{Consumer Surplus} + \text{Producer Surplus}\end{aligned}$$

- If allocation of resources maximizes total surplus, the outcome is *efficient*
- We might also care about *equality* and whether buyers and sellers in the market receive similar level of economic well-being

Evaluating Market Equilibrium

Figure 7 **Consumer and Producer Surplus in the Market Equilibrium**

Total surplus—the sum of consumer and producer surplus—is the area between the supply and demand curves up to the equilibrium quantity.



Some insights

1. Free markets allocate the supply of goods to the buyers who value them most, as measured by their willingness to pay

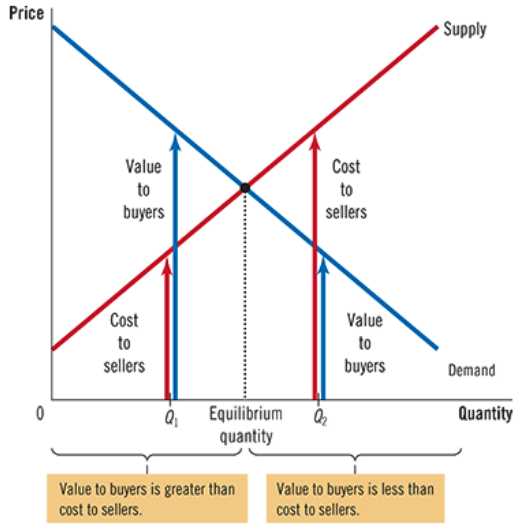
2. Free markets allocate the demand for goods to the sellers who can produce them at the lowest cost

3. Free markets produce the number of goods that maximizes the sum of consumer and producer surplus

Efficiency of the equilibrium quantity

Figure 8 **The Efficiency of the Equilibrium Quantity**

At quantities less than the equilibrium quantity, such as Q_1, the value to buyers exceeds the cost to sellers. At quantities greater than the equilibrium quantity, such as Q_2, the cost to sellers exceeds the value to buyers. Therefore, the market equilibrium maximizes the sum of producer and consumer surplus.



Conclusion

A word of warning

- We made several assumptions to include that markets are efficient

- We assumed that markets are perfectly competitive and that market outcomes only matter to buyers and sellers

- When these assumptions do not hold, and they do not hold most of the time, the conclusion that at equilibrium the market is efficient no longer holds

- In reality, some markets are monopolistic

- Market transactions also matter to third parties that aren't the buyers and sellers (we call this externalities)

Problems and Applications

Question 1

Melissa buys an iPhone for 240 and gets consumer surplus of 160

What is her willingness to pay?

- Willingness to pay is the sum of the price paid and consumer surplus. Therefore, Melissa's willingness to pay is 400 = 240 + 160

If she had bought the iPhone on sale for 180, what would her consumer surplus have been?

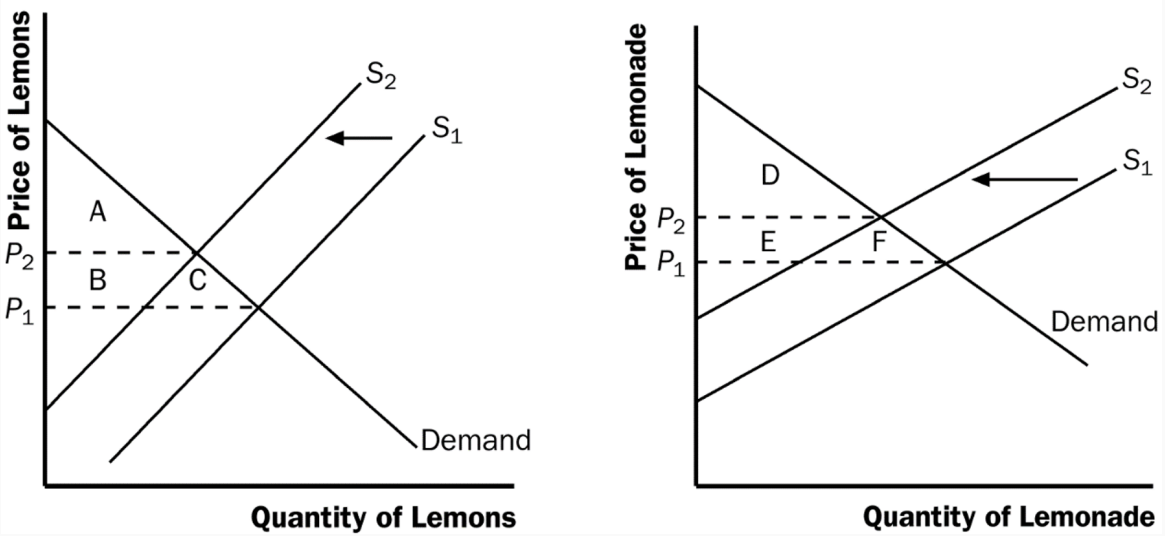
- Her consumer surplus at a price of 180 would be 400 − 180 = 220

If the price of an iPhone were 500, what would her consumer surplus have been?

- If the price of an iPhone was 500, Melissa would not have purchased one because the price is greater than her willingness to pay. Therefore, she would receive no consumer surplus.

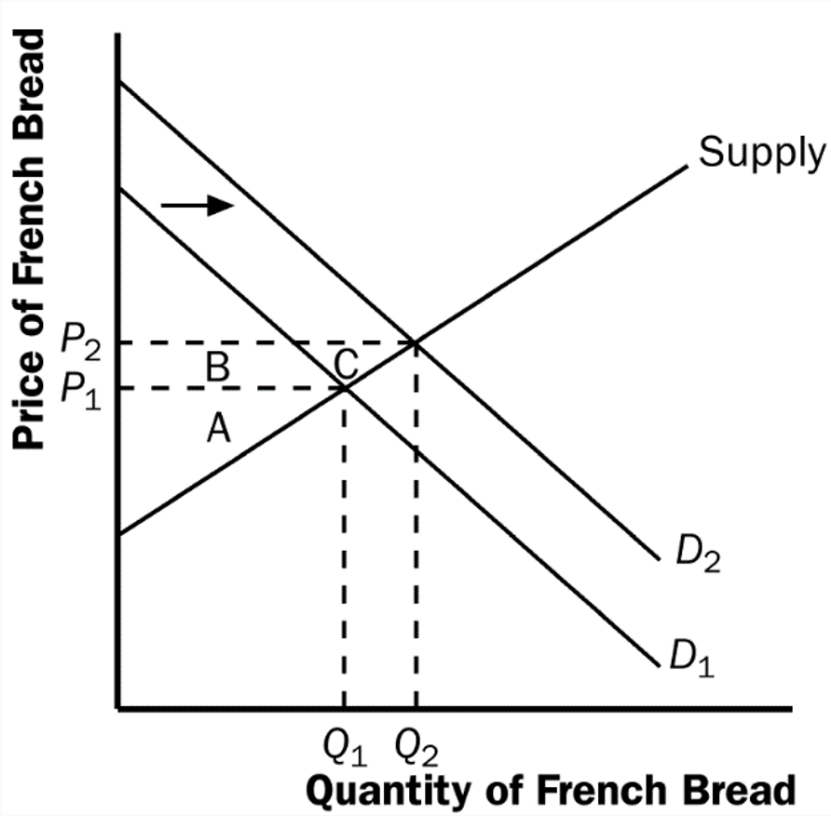
Question 2

An early freeze in California sours the lemon crop. Explain what happens to consumer surplus in the market for lemons. Explain what happens to consumer surplus in the market for lemonade. Illustrate your answers with diagrams.



Question 3

Suppose the demand for French bread rises. Explain what happens to producer surplus in the market for French bread. Explain what happens to producer surplus in the market for flour. Illustrate your answers with diagrams.

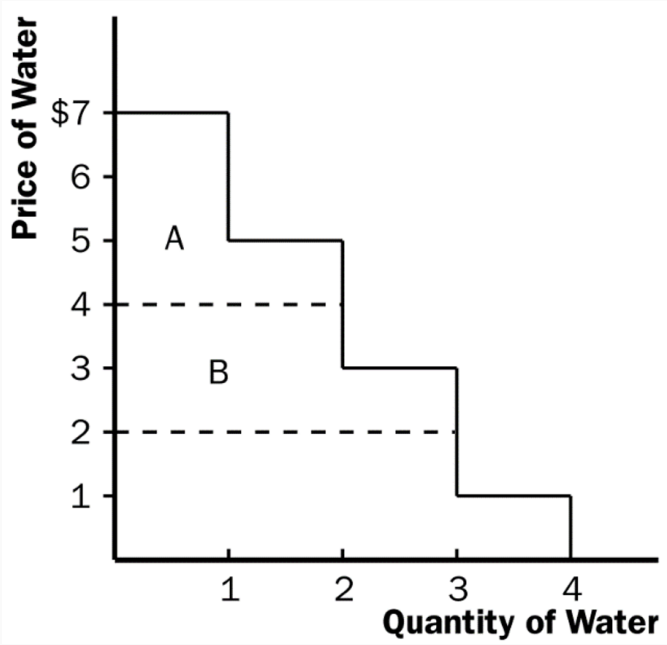


Question 4

It is a hot day, and Bert is thirsty. Here is the value he places on each bottle of water:

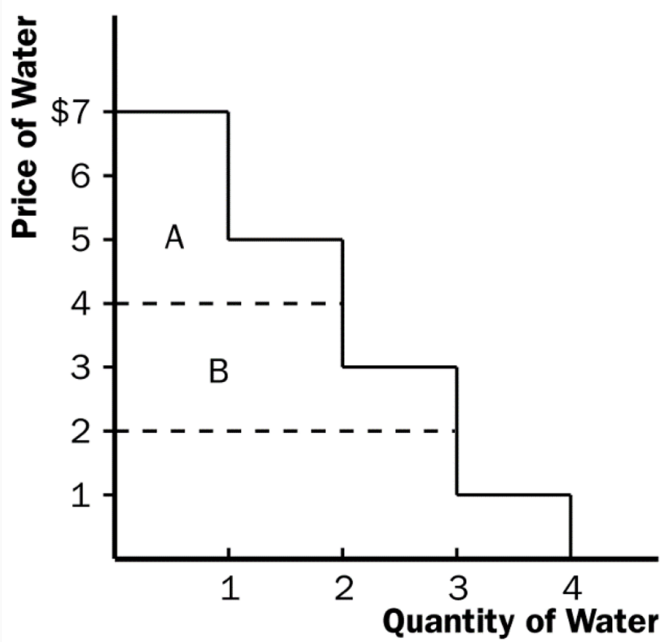
$$\begin{aligned}\text{Value of first bottle} &= 7\\ \text{Value of second bottle} &= 5\\ \text{Value of third bottle} &= 3\\ \text{Value of fourth bottle} &= 1\end{aligned}$$

From this information, derive Bert's demand schedule. Graph his demand curve for bottled water.



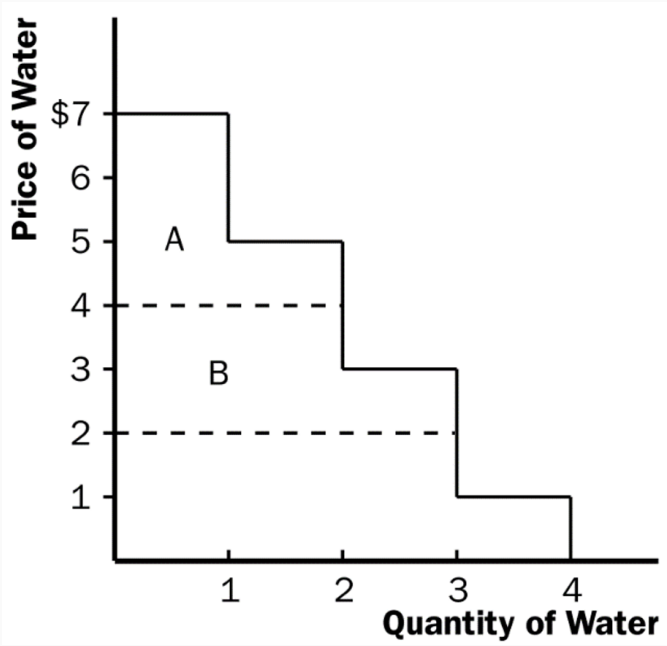
Question 4

If the price of a bottle of water is $4, how many bottles does Bert buy? How much consumer surplus does Bert get from his purchases? Show Bert's consumer surplus in your graph.



Question 4

If the price falls to $2, how does quantity demanded change? How does Bert's consumer surplus change? Show these changes in your graph.

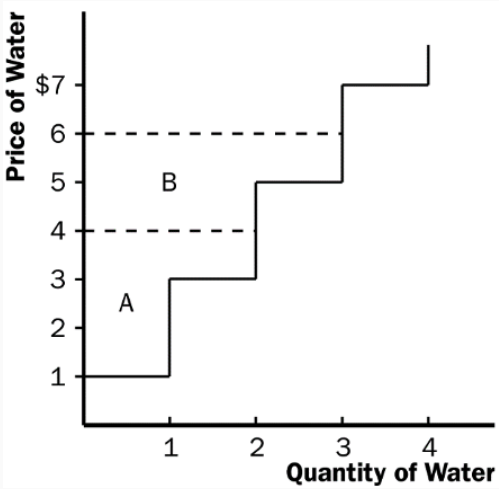


Question 5

Ernie owns a water pump. Because pumping large amounts of water is harder than pumping small amounts, the cost of producing a bottle of water rises as he pumps more. Here is the cost he incurs to produce each bottle of water:

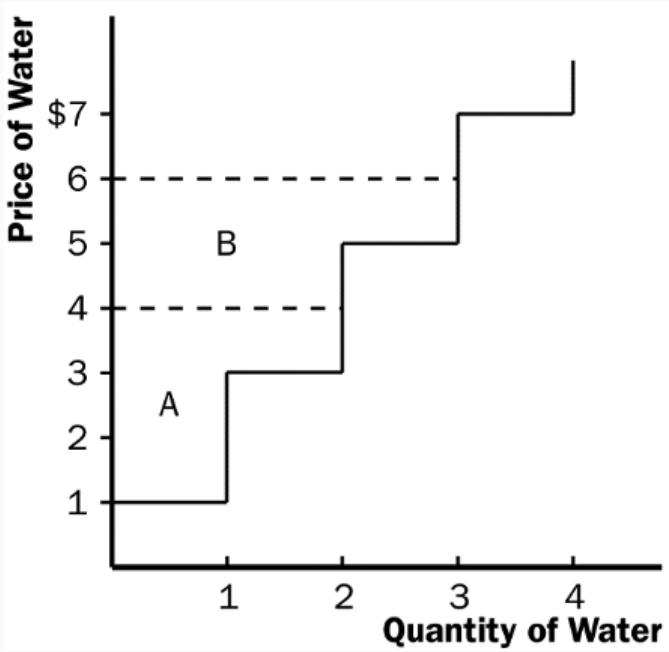
$$\begin{aligned}\text{Cost of first bottle} &= 1\\ \text{Cost of second bottle} &= 3\\ \text{Cost of third bottle} &= 5\\ \text{Cost of fourth bottle} &= 7\end{aligned}$$

From this information, derive Ernie's supply schedule. Graph his supply curve for bottled water.



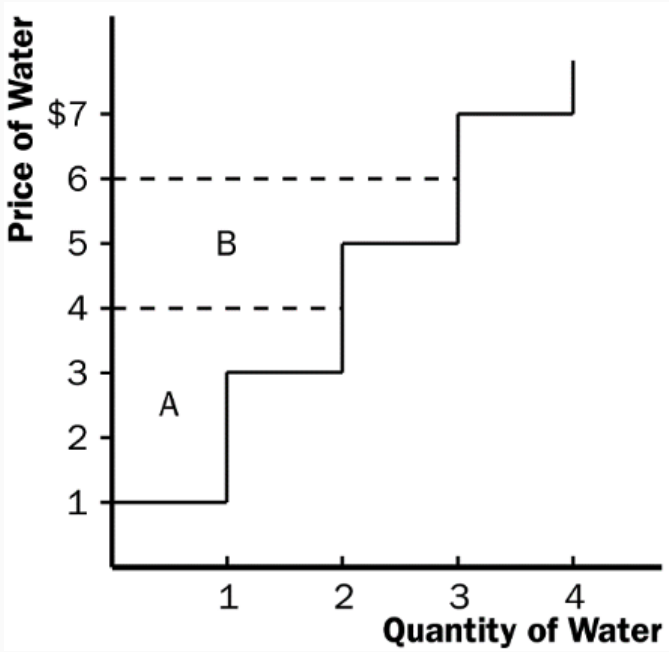
Question 5

If the price of a bottle of water is $4, how many bottles does Ernie produce and sell? How much producer surplus does Ernie get from these sales? Show Ernie's producer surplus in your graph.



Question 5

If the price rises to $6, how does quantity supplied change? How does Ernie's producer surplus change? Show these changes in your graph.



Question 6

Consider a market in which Bert from problem 4 is the buyer and Ernie from problem 5 is the seller.

Use Ernie's supply schedule and Bert's demand schedule to find the quantity supplied and quantity demanded at prices of $2, $4, and $6. Which of these prices brings supply and demand into equilibrium?

Price	Quantity Supplied	Quantity Demanded
$2	1	3
$4	2	2
$6	3	1

Question 6

Consider a market in which Bert from problem 4 is the buyer and Ernie from problem 5 is the seller.

What are consumer surplus, producer surplus, and total surplus in this equilibrium?

Price	Quantity Supplied	Quantity Demanded
$2	1	3
$4	2	2
$6	3	1

At a price of $4, consumer surplus is $4 and producer surplus is $4, as shown in Problems 3 and 4 above. Total surplus is $4 + $4 = $8.

Question 6

Consider a market in which Bert from problem 4 is the buyer and Ernie from problem 5 is the seller.

If Ernie produced and Bert consumed one fewer bottle of water, what would happen to total surplus?

Price	Quantity Supplied	Quantity Demanded
$2	1	3
$4	2	2
$6	3	1

If Ernie produced one less bottle, his producer surplus would decline to $3, as shown in Problem 4 above. If Bert consumed one less bottle, his consumer surplus would decline to $3, as shown in Problem 3 above. So total surplus would decline to $3 + $3 = $6.

Question 6

Consider a market in which Bert from problem 4 is the buyer and Ernie from problem 5 is the seller.

If Ernie produced and Bert consumed one additional bottle of water, what would happen to total surplus?

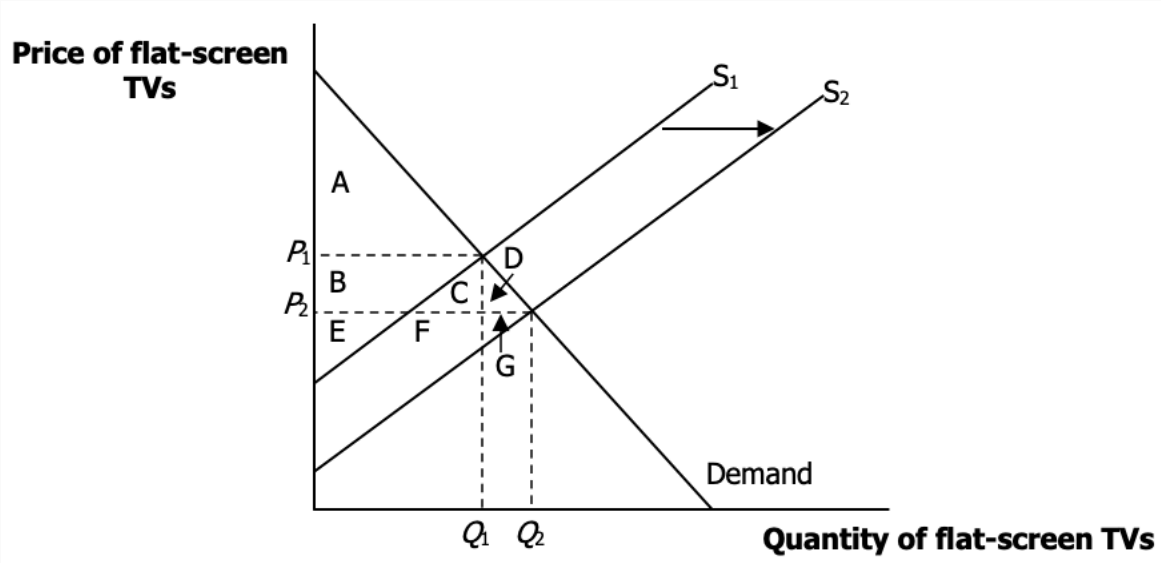
Price	Quantity Supplied	Quantity Demanded
$2	1	3
$4	2	2
$6	3	1

If Ernie produced one additional bottle of water, his cost would be $5, but the price is only $4, so his producer surplus would decline by $1. If Bert consumed one additional bottle of water, his value would be $3, but the price is $4, so his consumer surplus would decline by $1. So total surplus declines by $1 + $1 = $2.

Question 7

The cost of producing flat-screen TVs has fallen over the past decade. Let's consider some implications of this fact.

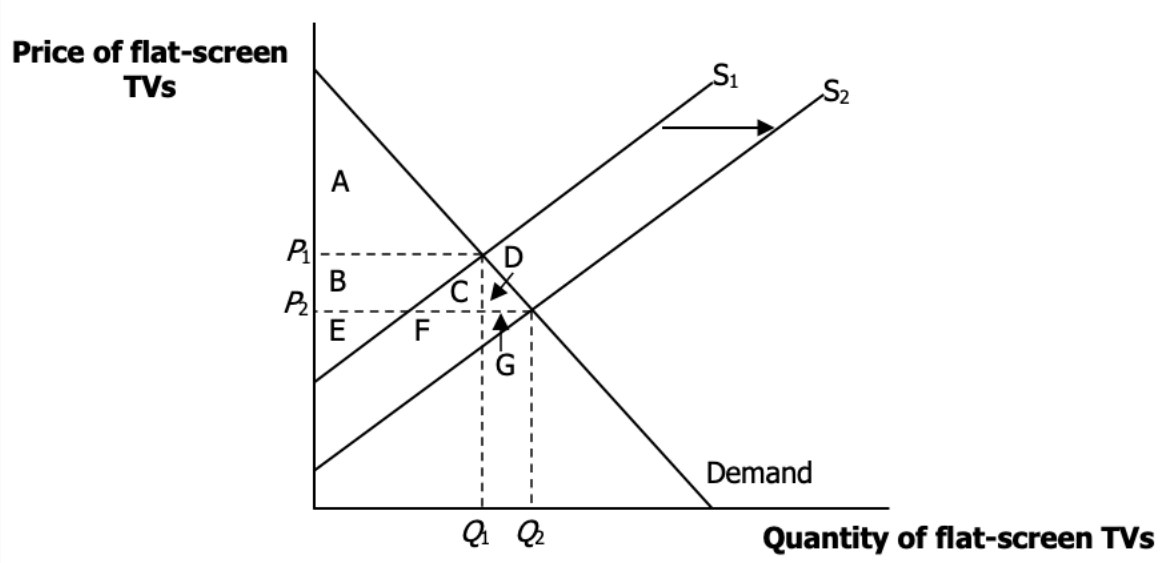
Draw a supply-and-demand diagram to show the effect of falling production costs on the price and quantity of flat-screen TVs sold.



Question 7

The cost of producing flat-screen TVs has fallen over the past decade. Let's consider some implications of this fact.

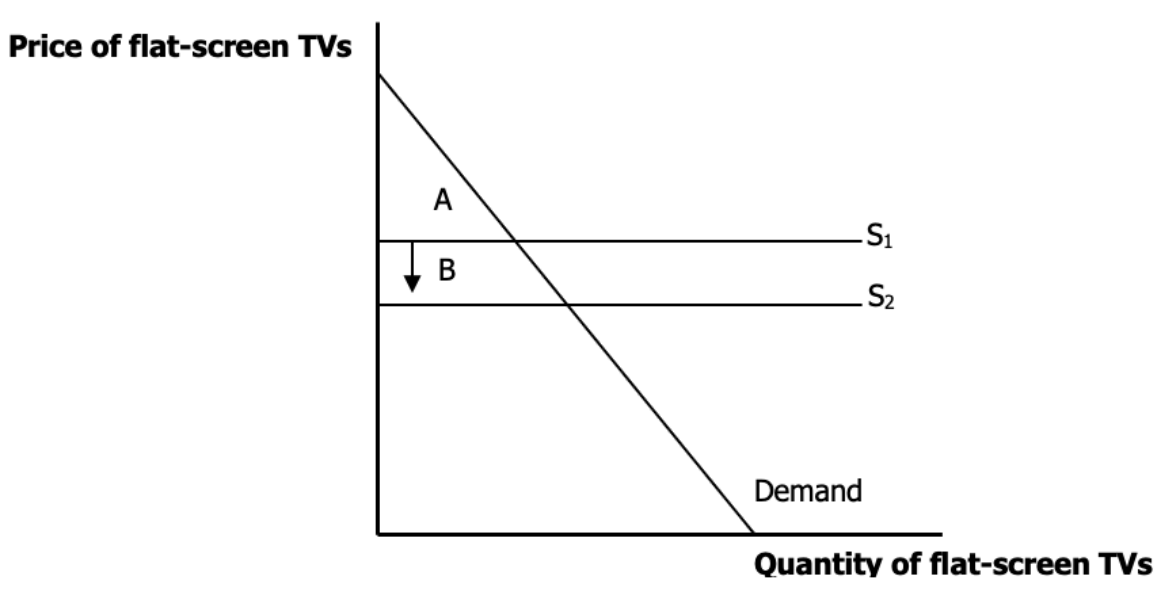
In your diagram, show what happens to consumer surplus and producer surplus.



Question 7

The cost of producing flat-screen TVs has fallen over the past decade. Let's consider some implications of this fact.

Suppose the supply of flat-screen TVs is very elastic. Who benefits most from falling production costs—consumers or producers of these TVs?



Question 8

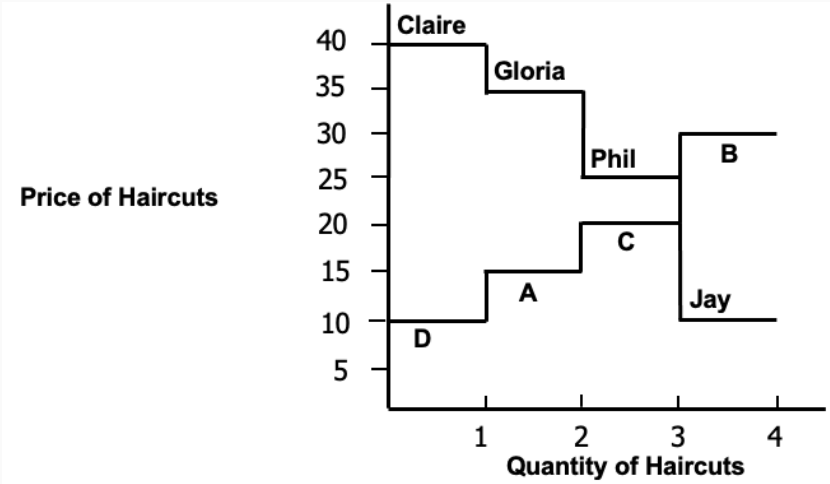
There are four consumers willing to pay the following amounts for haircuts:

- Gloria 35, Jay 10, Claire 40, Phil 25

There are four haircutting businesses with the following costs:

- Firm A 15, Firm B 30, Firm C 20, Firm D 10

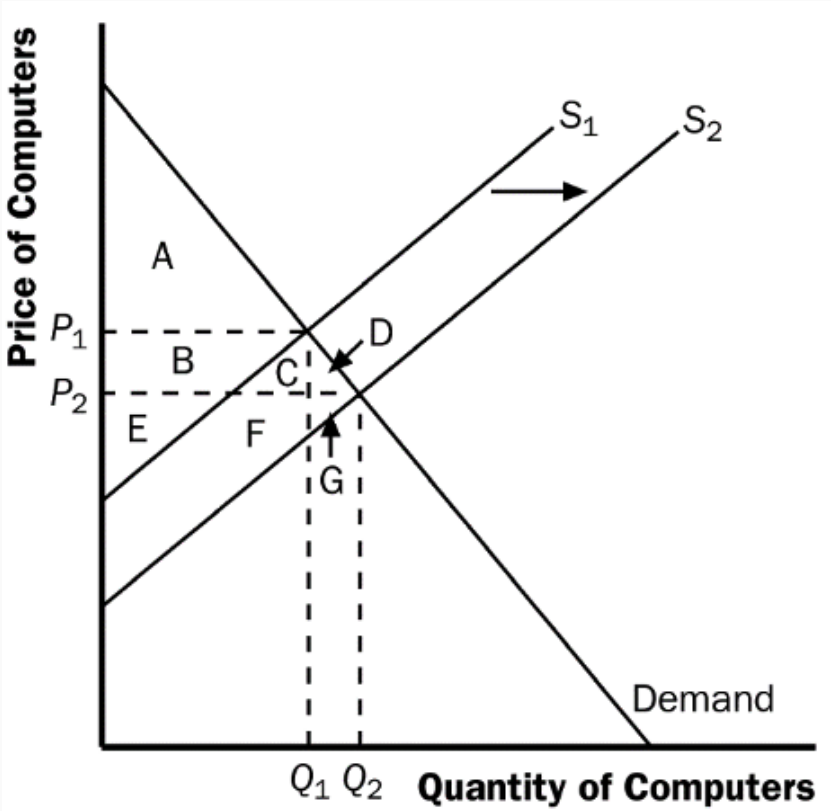
Each firm has the capacity to produce only one haircut. To achieve efficiency, how many haircuts should be given? Which businesses should cut hair and which consumers should have their hair cut? How large is the maximum possible total surplus?



Question 9

One of the largest changes in the economy over the past several decades is that technological advances have reduced the cost of making computers.

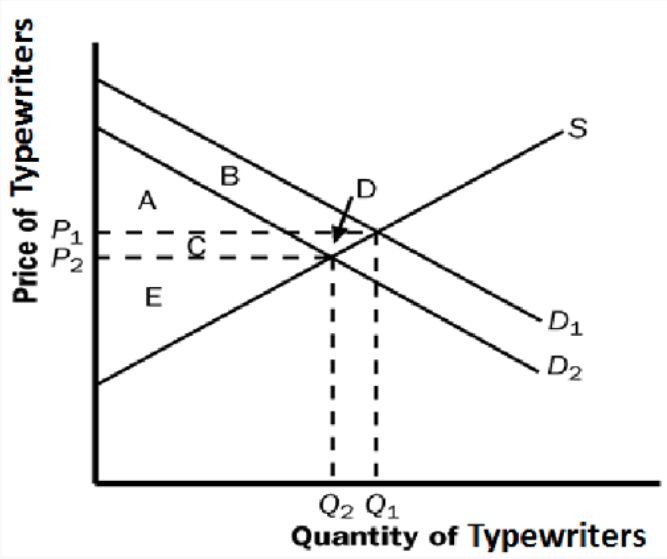
Draw a supply-and-demand diagram to show what happened to price, quantity, consumer surplus, and producer surplus in the market for computers.



Question 9

One of the largest changes in the economy over the past several decades is that technological advances have reduced the cost of making computers.

Forty years ago, students used typewriters to prepare papers for their classes; today they use computers. Does that make computers and typewriters complements or substitutes? Use a supply-and-demand diagram to show what happened to price, quantity, consumer surplus, and producer surplus in the market for typewriters. Should typewriter producers have been happy or sad about the technological advance in computers?



Question 9

One of the largest changes in the economy over the past several decades is that technological advances have reduced the cost of making computers.

Are computers and software complements or substitutes? Draw a supply-and-demand diagram to show what happened to price, quantity, consumer surplus, and producer surplus in the market for software. Should software producers have been happy or sad about the technological advance in computers?