**Economics 102**

**Summer 2013**

**Answers to Homework #2**

**Due July 2, 2013**

**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. Please remember the section number for the section **you are registered,** because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please remember to

* Staple your homework before submitting it.
* Do work that is at a professional level: you are creating your “brand” when you submit this homework!
* Not submit messy, illegible, sloppy work.

1. This set of questions is meant as a review of supply and demand shifts. For each question assume the market is initially in equilibrium.

a. Consider the market for bicycles. Suppose that the price of gasoline doubles due to the imposition of higher excise taxes on gasoline consumption. What do you predict will happen to the equilibrium price and quantity in the market for bicycles? Explain your answer.

b. Consider the market for bicycles. Suppose that the price of gasoline doubles due to the imposition of higher excise taxes on gasoline consumption. At the same time the cost of labor used to construct bicycles increases. What do you predict will happen to the equilibrium price and quantity in the market for bicycles? Explain your answer.

c. Consider the market for soft drinks. Suppose that the country enacts legislation banning the use of corn syrup in these drinks and this causes suppliers of soft drinks to use a more expensive sweetener. What do you predict will happen to the equilibrium price and quantity in the market for soft drinks? Explain your answer.

d. Consider the market for soft drinks. Suppose that people’s income rise and the income elasticity of demand for soft drinks is a positive number. What do you predict will happen to the equilibrium price and quantity in the market for soft drinks? Explain your answer.

e. Consider the market for soft drinks. Suppose that people’s income rise and the income elasticity of demand for soft drinks is a negative number. In addition the country enacts legislation banning the use of corn syrup in these drinks and this causes suppliers of soft drinks to use a more expensive sweetener. What do you predict will happen to the equilibrium price and quantity in the market for soft drinks? Explain your answer.

f. Consider the market for tea bags. You are told that the price of coffee has increased. You also know that the cross price elasticity of demand between tea bags and coffee is a positive number. What do you predict will happen to the equilibrium price and quantity in the market for tea bags? Explain your answer.

Answer:

For all of these scenarios you may find it helpful to draw a sketch of the initial market equilibrium and then draw the relevant shifts in the demand and/or supply curves to see what happens to the equilibrium price and quantity.

a. When the price of gasoline increases this results in a rightward shift in the demand for bicycles since bicycles and cars are substitutes for one another. Equilibrium quantity and price in the market for bicycles should increase relative to their initial levels.

b. When the price of gasoline increases this results in a rightward shift in the demand for bicycles since bicycles and cars are substitutes for one another. When the price of labor used to construct bicycles increases this results in a leftward shift in the supply of bicycles, since at every price the cost of producing bicycles has risen. Since we do not know the relative size of these two shifts we cannot predict with certainty what will happen to the new equilibrium quantity in the bicycle market: this quantity may increase, decrease or remain the same as the initial equilibrium quantity. We do know that the equilibrium price will increase relative to the initial equilibrium price.

c. When the use of corn syrup is banned this shifts the supply curve to the left as suppliers use relatively more expensive sweeteners to make their product. This will result in the equilibrium quantity decreasing while the equilibrium price increases.

d. As income increases the demand curve for soft drinks will shift to the right. We know that it will shift to the right because the income elasticity of demand for soft drinks is a positive number: this implies that as income increases, the quantity of soft drinks demanded increases at every price. Thus, the prediction is that the equilibrium price will increase and the equilibrium quantity will increase.

e. As income increases the demand curve for soft drinks will shift to the left. We know that it will shift to the left because the income elasticity of demand for soft drinks is a negative number: this implies that as income increases, the quantity of soft drinks demanded decreases at every price. In addition, the use of a more expensive sweetener will increase the cost of producing soft drinks: at every price the quantity of soft drinks supplied will fall. Thus, the supply curve will shift to the left. Since both curves shift and we do not know the magnitude of these two shifts we can only predict that the equilibrium quantity will decrease while the equilibrium price may increase, decrease, or remain the same.

f. The demand for tea bags shifts to the right when the price of coffee increases. We know that the demand curve shifts to the right because the cross price elasticity of demand between these two goods is a positive number: this implies that as the price of coffee increases the quantity demanded of tea bags also increases. The equilibrium price and quantity will both increase.

2. Suppose the market for fruit juice in Xia, a small closed economy, is a competitive market with the following demand and supply curves:

Domestic Demand: P = 5 – (1/100)Q

Domestic Supply: P = (1/400)Q

where P is the price per quart of juice and Q is the quantity of fruit juice measured in quarts.

a. Given the above information, what is the equilibrium price and quantity in this market?

b. Given the above information, what is the value of consumer surplus (CS) and producer surplus (PS)?

Suppose that the government of Xia decides to open its fruit juice market to trade and the world price of fruit juice is $2 per quart.

c. Describe verbally the effect on Xia of this decision. Be specific and thorough in your description.

d. When Xia opens this market to trade and the world price of fruit juice is $2 per quart, what happens to the value of CS, the value of PS, the level of domestic consumption of fruit juice, and the level of imports or exports?

e. Given your answer in (d), would you conclude that trade is beneficial to Xia? Be specific in your answer and explain who benefits and who loses from this trade and what the overall impact is on this economy of opening this market to trade.

Answers:

a. To find the equilibrium set the two equations equal to one another:

5 – (1/100)Q = (1/400)Q

(400)(5) – 4Q = Q (examine what I am doing here-this is a handy “short-cut” when finding the solution without the use of a calculator: note that I am not going to actually do the multiplication of (400)(5) unless I find it absolutely necessary)

(400)(5) = 5Q

Q = 400 quarts of fruit juice (I didn’t need to do that multiplication!)

P = 5 – (1/100)(Q) = 5 – (1/100)(400) = $1 per quart of fruit juice

Or, P = (1/400)(400) = $1 per quart of fruit juice

b. CS = (1/2)($5 per quart - $1 per quart)(400 quarts) = $800

PS = (1/2)($1 per quart - $0 per quart)(400 quarts) = $200

c. Since the world price is greater than the equilibrium price in the closed market this tells us that Xia will export the good in order to take advantage of the fact that the good will sell for a higher price elsewhere in the world. This means that domestic consumption of the good will fall as the price rises to the world price: as price rises the quantity demanded by domestic consumers will decrease. We can also expect that the total amount of the good provided by Xia’s producers will increase: as the price of the good increases, the quantity supplied of the good increases. Opening this market to trade will increase the producer surplus in Xia (producers will sell more of their good and they will sell it at a higher price) and it will decrease consumer surplus in Xia (consumers will buy less of the good and they will pay a higher price).

d. CS with trade = (1/2)($5 per quart - $2 per quart)(300 quarts) = $450

PS with trade = (1/2)($2 per quart - $0 per quart)(800 quarts) = $800

Domestic Quantity Consumed = 300 quarts [to find this use the demand curve and set P = $2 per quart: thus, P = 5 – (1/100)(Q) implies 2 = 5 – (1/100)(Q) or Q = 300 quarts)

Exports = Quantity Supplied Domestically at the World Price – Quantity Demanded Domestically at the World Price = 800 – 300 = 500 quarts

e. Overall trade is beneficial to the economy of Xia since total surplus increases with trade: initially as a closed economy total surplus was equal to $1000 and then, with trade, total surplus is equal to $1250. But, there are winners and losers in Xia because of this trade: domestic consumers are made worse off when the government of Xia opens this market to trade- domestic consumers pay higher prices, consume smaller quantities, and see their area of consumer surplus decrease from $800 to $450; domestic producers are made better off when the government of Xia opens this market to trade – domestic producers receive higher prices, sell larger quantities, and see there area of producer surplus increase from $200 to $800. Trade is beneficial, but it has distributional consequences.

3. Suppose the small closed economy of Zipia has the following domestic demand and domestic supply curves for mangos:

Domestic Demand: P = 100 – 4Q

Domestic Supply: P = 20 + Q

where P is the price per box of mangos and Q is the number of boxes of mangos. Furthermore, you know that the world price of mangos is $24 per box.

a. If Zipia opens this market to trade, will Zipia import or export mangos? Provide a numerical value of the level of imports or exports and explain in your answer why Zipia either imports or exports mangos once this market is open to trade.

b. Suppose that Zipia opens this market to trade, but at the same time, imposes a quota in this market. The license holder revenue from this quota is equal to $40. Given this information, calculate the quota that has been imposed on this market. Show your work and the logic that lies behind your work. Actually when you do this find the two possible quota levels that could have been imposed in this market with the result that license holder revenue is equal to $40 due to the quota. After you do the work and show this work, fill in the following table with the two possible quotas that could be imposed:

Possible Solutions to this question:

|  |  |
| --- | --- |
| Quota 1 =  | Quota 2 =  |
| Price with Quota 1 =  | Price with Quota 2 =  |
| Quantity Demanded Domestically with Quota 1 =  | Quantity Demanded Domestically with Quota 2 =  |
| Quantity Supplied Domestically with Quota 1 =  | Quantity Supplied Domestically with Quota 2 =  |
| Level of imports with Quota 1 =  | Level of imports with Quota 2 =  |

c. Given the possible quotas imposed in (b), what is the value of the deadweight loss due to the imposition of these possible quotas? Are the deadweight loss amounts the same with either quota amount? Show your work and then record your DWL findings in the following table:

Possible Quotas:

|  |  |
| --- | --- |
| Quota 1 | Quota 2 |
| DWL with “Quota 1”= | DWL with “Quota 2” =  |

d. For one of the quotas (you choose which one you want to use) describe verbally why there are two areas of deadweight loss and the reason why each of these areas is a deadweight loss when the quota is imposed on the market.

Answer:

a. To determine if Zipia will import or export mangos once this market is opened to trade we need to be able to compare the market price in the closed economy with the world price when the market is open to trade. The market price in the closed economy is found by setting the demand equation equal to the supply equation: thus, 100 – 4Q = 20 + Q or Q = 16 boxes of mangos. To find the market price, use this quantity and either the market demand curve or the market supply curve: thus, P = 100 – 4Q or P = 20 + Q: we get P = 100 – 4(16) = $36 per box of mangos; or P = 20 + 16 = $36 per box of mangos. Since the world price of $24 per box of mangos is less than the market price in the closed economy this tells us that Zipia will import mangos when they open this market to trade.

We can find the level of imports by substituting the world price of $24 per box of mangos into the domestic demand curve to get the quantity of mangos demanded domestically at the world price: 24 = 100 – 4Q or Q demanded domestically is 19 boxes of mangos. Substituting the world price of $24 per box of mangos into the domestic supply curve will provide us with the quantity of mangos supplied domestically at the world price: 24 = 20 + Q or Q supplied domestically is 4 boxes of mangos. The excess demand of 15 boxes of mangos will be imported into Zipia and sold at the world price of $24 per box of mangos.

b. To find this we will need to figure out some mathematical relationships that exist between price with the quota and the world price, the quantity supplied domestically with the quota, the quantity demanded domestically with the quota, and the license holder revenue. I found it helpful to draw a graph of the market when working out the algebra (I suggest you try to draw this graph as well!). Here goes:

i) We know that at the price with the quota, (the quantity supplied domestically) + (the amount of the quota) = (the quantity demanded domestically). We can use the initially given domestic demand and supply equations and solve each of these in terms of quantity in order to rewrite this equation as follows:

Domestic Demand: P = 100 – 4Q or Q = 25 – (1/4)P

Domestic Supply: Q = P – 20

So, (P – 20) + quota = 25 – (1/4)P

Rearranging and simplifying we can write this equation as

Quota = 45 – (5/4)P or P = 36 – (4/5)(Quota)

ii) We will need another equation with the same variables (Quota and P) if we hope to find a solution efficiently (I don’t want to “hunt” for this!). So, I know that [(the price with the quota) – (world price)][quota] = $40. All I am doing here is finding the area of the license holder revenue in the graph. I know the world price is $24 so I can rewrite this equation as (P – 24)(Quota) = 40

iii) With these two equations I can find a solution:

[(36 – (4/5)Quota – 24][Quota] = $40

[12 – (4/5)(Quota)][Quota] = 40

12(Quota) – (4/5)(Quota)(Quota) = 40 [From here I am going to use the symbol “q” for “quota”]

12q – (4/5)q2 = 40

0 = 40 – 12q + (4/5)q2

0 = 200 – 60q + (4)q2

0 = 4[50 – 15q + q2 ]

0 = 50 – 15q + q2

We can factor this fairly easily!

0 = (5 – q)(10 – q) and then use each term to find a possible answer:

5 – q = 0 or q = 5

And 10 – q = 0 or q = 10

So, a quota of either 5 units or 10 units will result in license holder revenue equaling $40 when the quota is imposed.

Possible Solutions to this question:

|  |  |
| --- | --- |
| Quota 1 = 5 boxes of mangos | Quota 2 = 10 boxes of mangos |
| Price with Quota 1 = $32 per box of mangos | Price with Quota 2 = $28 per box of mangos |
| Quantity Demanded Domestically with Quota 1 = 17 boxes of mangos | Quantity Demanded Domestically with Quota 2 = 18 boxes of mangos |
| Quantity Supplied Domestically with Quota 1 = 12 boxes of mangos | Quantity Supplied Domestically with Quota 2 = 8 boxes of mangos |
| Level of imports with Quota 1 = 5 boxes of mangos | Level of imports with Quota 2 = 10 boxes of mangos |

c. When the quota is 5 units the areas of DWL can be calculated as follows:

DWL with “Quota 1” = (1/2)($32 per box of mangos - $24 per box of mangos)(12 boxes – 4 boxes) + (1/2)($32 per box of mangos - $24 per box of mangos)(19 boxes – 17 boxes) = $40

When the quota is 10 units the areas of DWL can be calculated as follows:

DWL with “Quota 2” = (1/2)($28 per box of mangos - $24 per box of mangos)(8 boxes – 4 boxes) + (1/2)($28 per box of mangos - $24 per box of mangos)(19 boxes – 18 boxes) = $10

The DWL value is different with the two tariffs.

Possible Quotas:

|  |  |
| --- | --- |
| Quota 1 | Quota 2 |
| DWL with “Quota 1”= $40 | DWL with “Quota 2” = $10 |

d. For the quota of 5 units: this quota raises the price of the good from the world price of $24 to the price with the quota, $32. This allows less efficient producers, in this case, domestic producers to produce the product instead of it being produced by more efficient producers, the producers located elsewhere in the world. So, the first triangle of DWL, the one that is on the left hand side of the graph of these areas corresponds to the quota making it possible for domestic “high cost” producers to produce a few more units of the good rather than having foreign “low cost” producers make the good.

The DWL triangle that is on the right hand side of the graph is the loss in consumer surplus that occurs when domestic consumers purchase the good at the price with the quota rather than the world price.

4. Consider the market for mopeds in Tarenia, a small closed economy. Currently domestic demand and supply for mopeds in Tarenia can be described by the following equations:

Domestic Demand: P = 10,000 – 2Q

Domestic Supply: P = 2000 + 6Q

where P is the price per moped and Q is the quantity of mopeds. Furthermore, you are told that the world price per moped is $5000.

a. Find the equilibrium price, equilibrium quantity, consumer surplus, and producer surplus in the moped market in Tarenia. Assume this market is closed to trade.

b. Now, suppose that the government of Tarenia opens the moped market to trade. Find the price of mopeds in Tarenia once this decision is made. Then determine the number of Mopeds that will be purchased in Tarenia, the number of mopeds that will be produced domestically, the number of mopeds that will be exported, and the number of mopeds that will be imported. Determine the level of consumer surplus in the moped market in Tarenia once the market is open to trade. Determine the level of producer surplus in the moped market in Tarenia once the market is open to trade.

c. Suppose the government of Tarenia opens the moped market to trade. Furthermore, the government decides to implement a tariff that raises the price of mopeds in Tarenia by $1800 above the world price. Given this tariff, determine the tariff revenue the government of Tarenia will earn, the deadweight loss due to the tariff, the level of consumer surplus with the tariff, and the level of producer surplus with the tariff.

d. Given the choice of a closed market for mopeds, an open market for mopeds, of an open market with the described tariff in (c), which of these options will producers of mopeds in Tarenia prefer? Explain your answer and make sure you present convincing evidence to support your argument.

Answers:

a. Start by setting the demand equation equal to the supply equation:

10,000 – 2Q = 2000 + 6Q

8Q = 8,000

Q = 1000 mopeds

Then use either the demand or the supply equation to find the equilibrium price:

P = 10,000 – 2Q = 10,000 – 2(1000) = $8000 per moped

Or, P = 2000 + 6Q = 2000 + 6(1000) = $8000 per moped

CS with closed economy = (1/2)($10,000 per moped - $8000 per moped)(1000 mopeds) = $1,000,000

PS with closed economy = (1/2)($8000 per moped - $2000 per moped)(1000 mopeds) = $3,000,000

b. At a world price of $5,000 per moped, domestic producers in Tarenia will produce according to the supply equation P = 2000 + 6Q. Substituting in the price of $5000 we get 5000 = 2000 + 6Q or the quantity supplied domestically = 500 mopeds. That is, 500 mopeds will be produced domestically.

At a world price of $5,000 per moped, domestic consumers in Tarenia will consume according to the demand equation P = 10,000 – 2Q. Substituting in the price of $5000 we get 5000 = 10,000 – 2Q or the quantity demanded domestically = 2500 mopeds. That is, 2500 mopeds will be consumed in Tarenia once this market is open to trade.

In the open market for mopeds in Tarenia there is excess demand of 2000 mopeds (2500 mopeds – 500 mopeds). This excess demand will be met by importing 2000 mopeds and selling these mopeds at the world price of $5000 per moped. There will be no exports since the world price is less than the closed economy price of mopeds in Tarenia.

CS with open economy = (1/2)($10,000 per moped - $5000 per moped)(2500 mopeds) = $6,250,000

PS with open economy = (1/2)($5000 per moped - $2000 per moped)(500 mopeds) = $750,000

c. For this question you first need to realize that the price of mopeds in Tarenia with an open economy that has the described tariff will be $6800 per moped. At $6800 per moped, domestic consumers will demand 1600 mopeds while domestic producers will supply 800 mopeds. The difference between these two numbers, the excess demand, will result in imports into Tarenia of 800 mopeds.

The tariff revenue will equal ($6800 per moped - $5000 per moped)(800 mopeds) = $1,440,000.

The deadweight loss will equal (1/2)($6800 per moped - $5000 per moped)(800 mopeds – 500 mopeds) + (1/2)($6800 per moped - $5000 per moped)(2500 mopeds – 1600 mopeds) = $1,080,000.

CS with the tariff = (1/2)($10,000 per moped - $6800 per moped)(1600 mopeds) = $2,560,000

PS with the tariff = (1/2)($6800 per moped - $2000 per moped)(800 mopeds) = $1,920,000

d. Domestic producers of mopeds in Tarenia will prefer the closed market option since it results in the greatest area of producer surplus:

PS with closed economy = $3,000,000

PS with open economy = $750,000

PS with open economy and tariff = $1,920,000

5. Suppose that there are three countries that trade with one another: Southland, Northland, and Eastland. The following equations represent the market demand curve for cotton in each of these three countries:

Market Demand for cotton in Southland: P = 100 – 2Q

Market Demand for cotton in Northland: P = 80 - Q

Market Demand for cotton in Eastland: Q = 50

where P is the price per unit of cotton and Q is the number of units of cotton. Furthermore you are given the following information about the production of cotton in these three countries:

Market Supply of cotton in Southland: P = Q

Market Supply of cotton in Northland: P = 20 + Q

Market Supply of cotton in Eastland: P = 20 + 2Q

Suppose there are no other countries that demand or supply cotton in this problem.

a. Given the above information, find the market demand curve for cotton if these three countries trade with one another.

b. Given the above information, find the market supply curve for cotton if these three countries trade with one another.

c. If these three countries produce cotton and trade with one another, what will the market equilibrium price and quantity of cotton be? Fill in the following table based on these countries trading with one another. [Hint: the numbers get a little messy, but you can do it!]

|  |  |  |  |
| --- | --- | --- | --- |
|  | Southland | Northland | Eastland |
| Quantity of Cotton Produced by each Country |  |  |  |
| Quantity of Cotton Demanded by each Country |  |  |  |
| Quantity of Cotton Exported by each Country |  |  |  |
| Quantity of Cotton Imported by each Country |  |  |  |

e. Look at your answers in the table: if you sum the exports and then sum the imports and compare the two numbers, are they the same? If not, you have an error and you need to go back through the problem to fix the error! In this example, the sum of exports must balance against the sum of imports.

Answer:

a. One way to find the market demand curve is to draw four graphs horizontally aligned with one another: the first graph would represent the market demand from Southland, the second graph would represent the market demand from Northland, the third graph would represent the market demand from Eastland, and the fourth would represent the horizontal summation (i.e., hold price constant and sum together the quantities produced by the three countries at that price) of the three individual country demand curves.

Alternatively, you are looking for the total quantity demanded at any given price. You could find this by rewriting the demand curves in x-intercept form and them summing them together. I will sketch this procedure out here:

Southland: P = 100 – 2Q is the same as Qs = 50 – (1/2)P where the subscript “s” stands for Southland

Northland: P = 80 – Q is the same as Qn = 80 – P

Eastland: Qe = 50 is already in x-intercept form

We know from inspection of the three demand curves in slope intercept form that our critical prices occur at $80 (at this price and higher prices there is no demand from Northland) and at $100 (at this price and higher prices there is no demand from Southland). So, for prices less than or equal to $80, Qtotal = (50 – (1/2)P) + (80 – P) + 50 or Qtotal = 180 – (3/2)P or rewriting this in slope intercept form, P = 120 – (2/3)Q.

For prices between $80 and $100, the market demand curve can be written as Qtotal = (50 – (1/2)P) + 50 or Qtotal = 100 – (1/2)P or rewriting this in slope intercept form, P = 200 – 2Q. Examine this carefully: when the price is $80 or more, Northland has no demand for cotton.

For prices greater than or equal to $100, the market demand curve is Q = 50 since both Northland and Southland will not demand cotton when the price reaches $100 or more.

b. Again you can find the market supply curve by drawing four horizontally aligned graphs: first graph represents the market supply curve for Southland, the second graph represents the market supply curve for Northland, the third graph represents the market supply curve for Eastland, and the fourth represents the horizontal summation of the three individual country supply curves.

Alternatively you are looking for the total quantity supplied at any given price. You could find this by rewriting the supply curves in x-intercept form and them summing them together. I will sketch this procedure here:

Southland: P = Q is the same as Qs = P

Northland: P = 20 + Q is the same as Qn = P – 20

Eastland: P = 20 + 2Q is the same as Qe = (1/2)P – 10

We know from inspection of the three supply curves in slope intercept form that a critical price is $20: below this price Northland and Eastland are both unwilling to supply the good. So we can expect in this example that the market supply curve will have two linear segments: the segment that corresponds to prices at or below $20 and the segment that corresponds to prices at or above $20.

So for prices less than or equal to $20, the total market supply curve will simply be the market supply curve of Southland since they are the only country willing to supply cotton at a price of $20 or less per unit. Thus, the total market supply curve for prices less than or equal to $20 is P = Q.

At prices equal to or greater than $20 all three countries are willing to supply cotton. So Qtotal = (P) + (P – 20) + ((1/2)P – 10) or Qtotal = (5/2)P -30 or, in slope intercept form P = (2/5)Q + 12.

c. The market equilibrium with trade will occur where the total market demand curve intersects the total market supply curve. But, this is a bit challenging since our total market demand curve has three linear segments and our total market supply curve has two linear segments: our solution must use the right segments! So, how do we figure out which equations are the right ones to use?

I drew a sketch that would provide some guidance and, to tell the truth, I actually drew two sketches: one with the total market demand (three segments here) and the other with the total market supply (two segments here). On the second graph I noted the point (20,20) because that’s the “kink” point: the point where the two market supply curve segments intersect with one another. I then noted that when the price was $80 in the demand graph that this was a “kink” point: at this point in the demand graph the price is $80 and the quantity is 60 units. You can verify this by plugging in $80 into the relevant total market demand equation. I then asked myself what the price for 60 units must be from the suppliers point of view: P = (2/5)Q + 12 or P = (2/5)(60) + 12 = $36. When I thought about these two points (60, 80) and (60, 36) and where they were in the graphs of the total market demand curve and the total market supply curve it made me realize that the two equations I needed for the equilibrium price and quantity were

 P = 120 – (2/3)Q

P = (2/5)Q + 12

So, 120 – (2/3)Q = (2/5)Q + 12 or 108 – (2/3)Q = (2/5)Q

15(108 – (2/3)Q) = 15(2/5)Q

(15)(108) – 10Q = 6Q

15(108) = 16Q

15(27) = 4Q

Q = 101.25 units of cotton

P = 120 – (2/3)Q = 120 – (2/3)(101.25) = $52.50

Or, P = (2/5)Q + 12 = (2/5)(101.25) + 12 = $52.50

|  |  |  |  |
| --- | --- | --- | --- |
|  | Southland | Northland | Eastland |
| Quantity of Cotton Produced by each Country | Q = PQ = 52.5 units of cotton | Q = P – 20Q = 52.5 – 20 = 32.5 units of cotton | Q = (1/2)P – 10Q = (1/2)(52.5) – 10 = 16.25 |
| Quantity of Cotton Demanded by each Country | 52.5 = 100 – 2QQ = 23.75 units of cotton | 52.5 = 80 – QQ = 27.5 units of cotton | Q = 50 units |
| Quantity of Cotton Exported by each Country | 52.5 – 23.75 = 28.75 units of cotton | 32.5 – 27.5 = 5 units of cotton | 0 |
| Quantity of Cotton Imported by each Country | 0 | 0 | 33.75 |