Solution to Midterm Exam, EC239OC, Spring 2018

Part A

1. **A**
2. **D**
3. **D**
4. **D**
5. **C**
6. **C**
7. **C**
8. **A**
9. **E**
10. **E**
11. **C**
12. **C**
13. **D**
14. **B**
15. **E**
16. **C**
17. **B**
18. **E**
19. **B**
20. **A**

PART B: SHORT-ANSWER QUESTIONS

Answer ANY TWO of the following questions [4 x 2 = 8 marks]

Question 1:
Discuss the three common misconceptions about comparative advantage. (4 marks)

Answer: Please see Lesson 3

Question 2:

Consider the Specific Factor Model with two goods (cloth and food) and three factors of production (Labour, Land and Capital). Now, suppose there is an improvement in technology that raises the marginal product of labour in cloth industry.
i. How will the allocation of labour change due to this technological improvement?
ii. What will happen to the real income of workers in the cloth and food industry?
iii. What will happen to the real income of the specific factors in the cloth and food industry?

[Use diagrams to explain your answer.] (4 marks)

i. With MPL higher than current equilibrium wage, the cloth sector will hire more workers which come from the food sector. This, labour move from food to cloth sector until the MPL is equal in both sectors and a new equilibrium is established at higher nominal wage.
ii. The equilibrium nominal wage increases and there is no change in the price of cloth or food. Hence, the real income of workers increases in terms of both cloth and food.
iii. In the food sector, with higher real income paid to workers, income of landowners decreases. In the cloth sector, the MPL shifts up and also real income paid to workers increases. As the nominal wage increases by a smaller percentage than the increase in productivity (holding price constant), the decrease in capital owners' income due to more paid to workers is more than offset by the gain in capital owners' income from higher output. Thus, income of capital owner increases. [Note, we are not considering any change in price of output]

Draw the diagram yourself.

Question 3:

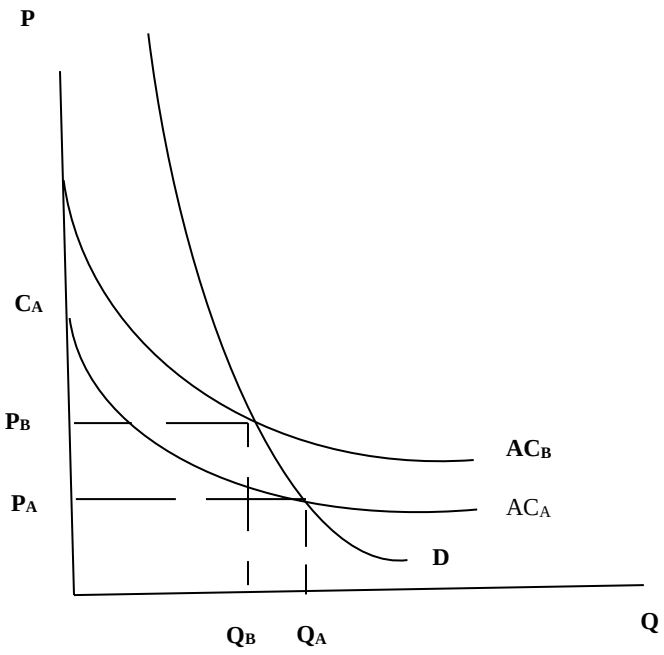
a) Show with the help of a **diagram** how a Country A that has comparative advantage in the production of "Tennis Rackets" might not be able to beat Country B in prices when B pioneered the Tennis Racket industry with a head start in Production. (2 marks)

b) In this situation, if the government of Country A restricts all imports of Tennis Rackets, how would the welfare change for domestic producers and consumers? (2 marks)

Answer:

As country B pioneered the tennis Racket industry, it becomes difficult for a firm in country A to start production. Because,t he initial AC for any firm in A would be higher than the price at which B is selling tennis rackets to the world. Even though country A could supply at a lower price, because of B's established advantage, A cannot get in the industry.

In this situation if the govt. Restricts import of rackets, consumers will have no choice but to buy from domestic sellers. Now, country A can get started and as it produces more, AC goes down. The consumers are better off with a price lower than that was offered by B. Producers are better off as they get to produce and their AC is allowed to decrease with higher output.



PART C: PROBLEM SOLVING QUESTIONS

Answer Any Two of the following Questions [6 x 2 = 12 marks]

Question 1:

(HO model, with two goods and with two factors of production) Suppose that at current factor prices a ton of steel is produced using 40 hours of labor and 2 acre of land, and a ton of wheat is produced using only 10 hours of labor and 2 acre of land. Suppose that the economy's total resources are 1200 hours of labor and 120 acres of land. Initially, P_S = \$1200/ton & P_W =\$600/ton.

(a) Now suppose that the labor supply increases to 2400 hours. State and prove the Rybczynski theorem. (3 marks)

(b) Suppose P_S increases to \$1800/ton (from the initial situation). State and prove the Stolper-Samuelson theorem. (3 marks)

a. The labour constraint: $a_{LS}. Q_S + a_{LW}. Q_W = L$ or $40 Q_S + 10Q_W = 1200$
The land constraint: $a_{TS}. Q_S + a_{TW}.Q_F = T$ or $5Q_S + 4Q_W = 120$

Solving the two factor constraints, we get $Q_S = 20$, $Q_W = 40$

After the increase in labour supply, the new labour constraint is L
$40 Q_S + 10Q_W = 2400$

Solving the constraints now, we get $Q_S = 60$, $Q_W = 0$

Rybczynski theorem: If we hold output prices constant as the amount of a factor of production increases, then the supply of the good that uses this factor intensively increases and the supply of the other good decreases.
Here, the increase in the supply of labour, increases the production of steel (Here, steel is the labour intensive good as steel uses relatively more labour than wheat (40/2 > 10/2) and decreases the production of wheat. Hence, the theorem is proved.

b. Unit cost of producing one ton of steel = $a_{LS}. w + a_{TS} . r = 40w + 2r$

Unit cost of producing one ton of wheat = $a_{LW}. w + a_{TW}. r = 10w + 2r$

Under perfect competition, P =MC

Hence, for steel 40 w +2r = 1200
And for wheat 10w + 2r= 600

Solving the two equations we get, w =20 and r =200

When price of steel increase to $1800/ton, we have 40w + 2r= 1800.

We can now solve for the new w & r using these two equations:

40w + 2r= 900 & 10w + 2r= 600

We get, w* = 40 and r* =100

Stolper-Samuelson theorem: if the relative price of a good increases, then the real wage or real lending/ renting rate of the factor used intensively in the production of that good increases, while the real wage or real lending/renting rate of the other factor decreases.

Here, the increase in the price of steel, increases the real wage of the factor that is intensively used in the production of steel [a_{LS}/a_{TS} = 40/2 = 20 for steel and a_{LW}/a_{TW} =10/2 = 5 for wheat] and decreases the real lending/renting rate of the other factor. Hence, the **Stolper-Samuelson theorem is proved.**

W increases by 100% and P_S increases by 50%, hence real wage of labour increases.

R decreases by 50% and P_W doesn't change ; hence real renting rate decreases.

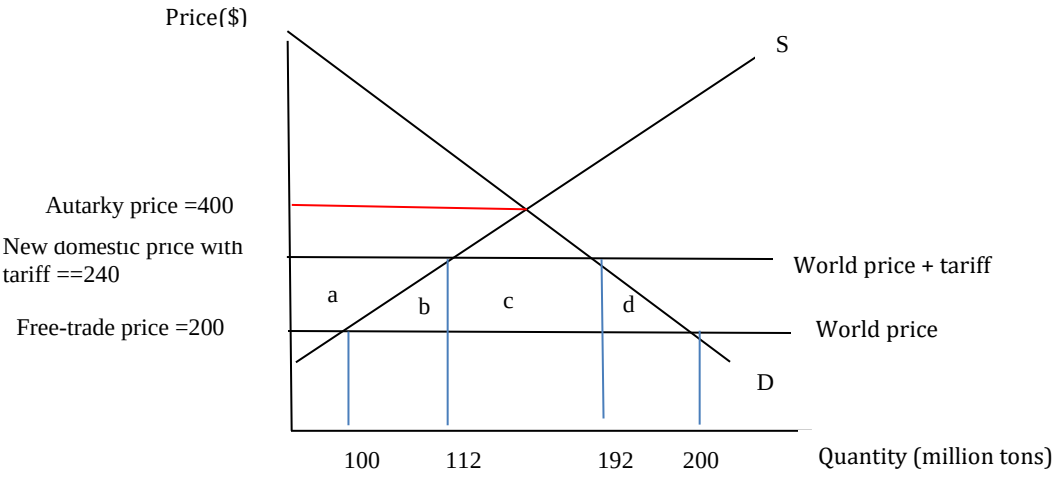
Question 2:

Suppose a small country can import "rice" at a world price of $200 per ton. Assume that at a price of $200, domestic quantity-demanded equals 200 million tons, and domestic quantity-supplied equals 100 million tons. Assume that for every $10 that price changes, quantity-supplied changes by 3 million tons, and quantity-demanded changes by 2 million tons.

a. Using a supply and demand diagram, show the free-trade equilibrium for this small country, clearly showing the autarky price, the free-trade price, the quantity-supplied, the quantity-demanded, and the quantity of imports. (2 marks)

b. Now suppose the small country's government imposed a $40 tariff on rice imports. Calculate the effect of this tariff on the domestic price, quantity-supplied, quantity-demanded, and imports, and show this on your graph. Calculate the effects on producer surplus, consumer surplus, and the government revenue from the $40 tariff. Relative to free trade, is the country better or worse off? (4 marks)

Answer:



ΔCS = a+b+c+d = 40 x 192 + 0.5x 8 x40 = - $7840 million

ΔPS = 40 x 100 + 0.5 x 12 x 40 = $ 4240 million

ΔGR = 40 x 80 = $3200 million
Net Effect = ΔCS + ΔPS + ΔGR = -7840+4240 +1600 = $ -400 million

The country is worse off.

Question 3:

Suppose we have a monopolistically competitive automobile industry in Canada. In autarky, the two relevant characterizations of a typical firm are:

$AC = (F/S)\, n + c$; $P = c + 1/(b \times n)$ where $b = 1/72{,}000$

Here, the size of the domestic market for automobile is S_C = 2,000,000 per period. The fixed cost of automobile production, F = $4,000,000,000. The marginal cost, c = $10,000. Now suppose the United States has identical cost function as Canada but a market size of S_{US} = 8,000,000.

(i) Calculate the equilibrium number of firms and the equilibrium price in the U.S. and Canada automobile markets without trade. (2 marks)

(ii) If U.S. and Canada allows free trade, what will be the equilibrium number of firms and the equilibrium price in the integrated market? (2 marks)

(iii) Suppose, the U.S. and Canada integrate their automobile market with a third country, which has an annual market size of 10 million for automobiles. Find the number of firms and the price per automobile in the new integrated market (with 3 markets combined) after trade.
(1 marks)

(iv) Are consumers better off with free trade? In what ways? (0.5 +0.5= 1 mark)

Answer:

We will first find the equilibrium P and n for each country in autarky and then the equilibrium P and n for the integrated market once Canada and U.S. engage in trade.

(i) Equilibrium P and n in autarky (Canada)

The equilibrium condition in a monopolistically competitive industry is P =AC.

Or $c + 1/(b \times n) = (F/S_C)\, n + c$

Using the given values, we get –

$10{,}000 + 72{,}000/n = [(4{,}000{,}000{,}000 \times n) / 2{,}000{,}000] + 10{,}000$

Or, $n^2 = 72{,}000/2{,}000 = 36$ or $n = 6$

Equilibrium price, $PC^* = 10{,}000 + 72{,}000/6 = \$22{,}000$

Equilibrium P and n in autarky (U.S.)

Again, we have P =AC Or $c + 1/(b \times n) = (F/S_{US})\, n + c$

Using the given values, we get –

$10{,}000 + 72{,}000/n = [(4{,}000{,}000{,}000 \times n) / 8{,}000{,}000] + 10{,}000$

Or, $n^2 = 72{,}000/500 = 144$ or, $n = 12$

Equilibrium price, $P_{US}^* = 10{,}000 + 72{,}000/12 = \$16{,}000$

(ii) Equilibrium P and n in the integrated market

When the Canadian and the U.S. automobile industry are integrated through trade, the size of the combined market is, $S = S_C + S_U = 2{,}000{,}000 + 8{,}000{,}000 = 10{,}000{,}000$

Using equilibrium condition, P =AC we get,

$10{,}000 + 72{,}000/n = [(4{,}000{,}000{,}000 \times n) / 10{,}000{,}000] + 10{,}000$

Or, $n^2 = 72{,}000/400 = 180$ or $n = 13$ (rounding down the decimals)

$P = 10{,}000 + 72{,}000/13 = \$15{,}538.46$

The consumers are better off with lower price and higher number of varieties.

(iii) Equilibrium P and n in the integrated market including a third country

Again, we have P =AC Or $c + 1/(b \times n) = (F/S_{US})\, n + c$

Using the given values, we get –

$10{,}000 + 72{,}000/n = [(4{,}000{,}000{,}000 \times n) / 20{,}000{,}000] + 10{,}000$

Or, $n^2 = 370$ or, $n = 19$

Equilibrium price, $P_{US}^* = 10{,}000 + 72{,}000/19 = \$13{,}789$

(iv) The consumers are better with more variety and lower price.