Practice Set 11 – KEY

Labor Market & Trade

This set contains practice material for your own use. It is highly recommended to work on the problems on your own. Do not just read the provided solutions. Instead, try to solve the problems and use the solutions only when you are stuck. Reading problems that someone else has solved has the same value on your preparation like watching someone running a marathon on TV and then expecting to be able to run it, too! If you have questions on this set, please ask your section's teaching assistant.

1. A firm produces firfirikia. The price of one firfiriki is 20 dollars. The firm has 3 machines. The production function of the firm is $Q = 3 \cdot K \cdot \sqrt{L}$, where K is the number of machines, L is the number of workers and Q is the quantity of firfirikia. The wage for the employment of one worker is 50 dollars. How many workers will this firm hire?

   The first worker produces $3 \cdot 3 \cdot \sqrt{1} = 9$ firfirikia, which are worth $9 \cdot 20 = 180$ dollars. Thus, $VMP_L = 180$, which exceeds the wage. The first worker should be hired.

   The second worker increases production to $3 \cdot 3 \cdot \sqrt{2} = 12.73$, so his contribution to production is $12.73 - 9 = 3.73$ firfirikia that are worth $3.73 \cdot 20 = 74.6$ dollars. Thus, $VMP_L = 74.6$, which exceeds the wage. The second worker should be hired.

   The third worker increases production to $3 \cdot 3 \cdot \sqrt{3} = 15.59$, so his contribution to production is $15.59 - 12.73 = 2.86$ firfirikia that are worth $2.86 \cdot 20 = 57.2$ dollars. Thus, $VMP_L = 57.2$, which exceeds the wage. The third worker should be hired.

   The fourth worker increases production to $3 \cdot 3 \cdot \sqrt{4} = 18$, so his contribution to production is $18 - 15.59 = 2.41$ firfirikia that are worth $2.41 \cdot 20 = 48.2$ dollars. Thus, $VMP_L = 48.2$, which does not exceed the wage. The fourth worker should not be hired.

   The firm will hire 3 workers.

2. If *Japan* dedicates its entire production capacity to producing *rice* it can produce 100 units and if it dedicates it to the production of *electronics*, it can produce 150 units. If *India* dedicates its entire production capacity to producing *rice* it can produce 70 units and if it dedicates it to the production of *electronics*, it can produce 80 units.

   (a) Find which country has the *absolute advantage* in which product.

	Japan	*India*
Rice	*100*	*70*
Electronics	*150*	*80*

   Japan can produce more of both products. Thus, it has the absolute advantage in both.

   (b) Find which country has the *comparative advantage* in which product.

   In order for Japan to produce 1 unit of rice, it must give up $150/100 = 1.5$ units of electronics. Thus, the opportunity cost of 1 unit of rice is 1.5 units of electronics for Japan. In order to produce 1 unit of electronics, Japan needs to give up $100/150 = 0.67$ units of rice. Therefore, the opportunity cost of electronics is 0.67 units of rice for Japan.

   For India, the opportunity cost of 1 unit of rice is $80/70 = 1.14$ units of electronics and the opportunity cost of 1 unit of electronics is $70/80 = 0.875$ units of rice.

Concerning electronics, Japan can produce at a cost of 0.67 units of rice per unit of electronics, while India can produce at a cost of 0.875 units of rice per unit of electronics. Japan is able to produce electronics at a lower opportunity cost, thus, Japan has the comparative advantage in electronics.

For rice, India can produce at a cost of 1.14 units of electronics per unit of rice, and Japan can produce at a cost of 1.5 units of electronics per unit of rice. India is able to produce rice at a lower opportunity cost, and thus, India has the comparative advantage in rice.

(c) Find the range of feasible *terms of trade* for which both countries would agree to trade.

Japan would want to sell electronics to India for anything above 0.67 units of rice per unit of electronics. This is because every unit of electronics sold for above its opportunity cost (0.67) yields economic profit for Japan.

India would be interested in buying electronics from Japan for anything below 0.875 units of rice per unit of electronics. This is because, at this price, it would be cheaper for India to buy electronics from Japan, instead of making it by itself.

Similarly, India would want to export rice to Japan for anything between 1.14 to 1.5 units of electronics per unit of rice.

(d) Calculate how much India and Japan could consume if trade is not allowed and each country dedicates half of its resources to the production of rice and the other half to the production of electronics.

Every country would produce half of its maximum quantities. That is:

	Japan	India
Rice	50	35
Electronics	75	40

(e) Assume that the actual terms of trade are 1.35 units of electronics per unit of rice, India needs to consume 38 units of rice and Japan needs to consume 77 units of electronics. Show that trade can allow the two countries to consume more from both goods than by not trading.

India will concentrate on the production of rice and produce 70 units of rice in total. From those, it will keep 38 and export the rest 32 units of rice to Japan. Because the terms of trade are 1.35 units of electronics per unit of rice, India must receive in exchange $32 \cdot 1.35 = 43.2$ units of electronics.

Japan now has to produce 43.2 units of electronics to export to India and another 77 units for itself. So, it needs a total of 120.2 units. Japan's productive ability for electronics is 150, thus, Japan still has resources left to produce either another $150 - 120.2 = 29.8$ units of electronics or $29.8 \cdot 0.67 = 19.97$ units of its own rice. Since Japan already meets its needs in electronics (77 units), it will prefer to use the rest of its resources in the production of 19.97 units of rice. Their total consumption of rice, therefore, would be $32 + 19.97 = 51.97$ units of rice.

All in all, if trade occurs, the two countries could consume:

	Japan	India
Rice	51.97	38
Electronics	77	43.2

Both countries can consume more of both goods under trade than under no trade.