

Practice Set 11

Labor Market & Trade

This set contains problems for your own practice. Do not just read the provided solutions — try to solve the problems first, and use the solutions only when you are stuck. Reading solutions without attempting the problems first has the same value for your preparation as watching someone else run a marathon and then expecting to be able to run it yourself. If you are unable to comprehend the solution of a problem even after reading the instructional answer key, you have most likely missed the relevant part of the material underlying this problem. Direct any questions about this problem set to your section's teaching assistant.

1. A firm produces firfirikia. The price of one firfiriki is \$20. 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 per worker is \$50. How many workers will this firm hire?
2. If Japan dedicates its entire production capacity to producing rice, it can produce 100 units; if it dedicates that capacity to electronics, it can produce 200 units. If India dedicates its entire production capacity to producing rice, it can produce 80 units; if it dedicates that capacity to electronics, it can produce 40 units.
 - (a) Find which country has the *absolute advantage* in which product.
 - (b) Find which country has the *comparative advantage* in which product.
 - (c) Find the range of feasible *terms of trade* for which both countries would agree to trade.
 - (d) Calculate how much India and Japan could consume if trade were not allowed and each country dedicates half of its resources to the production of rice and the other half to the production of electronics.
 - (e) The terms of trade are 1 unit of electronics per unit of rice. Show that trade allows both countries to enjoy 10 units more of each good in comparison to (d).

Answer Key

1. A firm produces firfirikia. The price of one firfiriki is \$20. 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 per worker is \$50. 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 . Thus, $VMP_L = 180$, which exceeds the wage. The first worker should be hired.

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

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

The fourth worker increases production to $3 \cdot 3 \cdot \sqrt{4} = 18$, contributing to production $18 - 15.59 = 2.41$ firfirikia that are worth $2.41 \cdot \$20 = \48.2 . 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; if it dedicates that capacity to electronics, it can produce 200 units. If India dedicates its entire production capacity to producing rice, it can produce 80 units; if it dedicates that capacity to electronics, it can produce 40 units.
 - (a) Find which country has the *absolute advantage* in which product.

	Japan	India
Rice	100	80
Electronics	200	40

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.

Japan:

- To produce 1 unit of rice, it must give up $200/100 = 2$ units of electronics.
- To produce 1 unit of electronics, it must give up $100/200 = 0.5$ units of rice.

India:

- To produce 1 unit of rice, it must give up $40/80 = 0.5$ units of electronics.
- To produce 1 unit of electronics, it must give up $80/40 = 2$ units of rice.

Japan produces electronics at a lower opportunity cost; thus, it has the comparative advantage in electronics. India produces rice at a lower opportunity cost; 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 0.5 units of rice per unit of electronics, since every unit of electronics sold at above its opportunity cost yields economic profit for Japan. India would buy electronics from Japan for anything below 2 units of rice per unit of electronics, since at that price it is cheaper to buy electronics from Japan than to produce them domestically. Therefore, the Japanese electronics would be traded between 0.5 and 2 units of rice. Similarly, India would export rice to Japan for anything between 0.5 and 2 units of electronics per unit of rice.

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

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

	<i>Japan</i>	<i>India</i>
<i>Rice</i>	50	40
<i>Electronics</i>	100	20

- (e) The terms of trade are 1 unit of electronics per unit of rice. Show that trade allows both countries to enjoy 10 units more of each good in comparison to (d).

India will specialize in rice and produce 80 units: 50 for itself and 30 to export to Japan for 30 units of electronics. India enjoys 50 rice and 30 electronics, both 10 units more than in (d).

Japan can produce up to 200 units of electronics. It needs 110 for itself, it must export 30 to India and it has 60 units capacity left. Japan uses this to produce $60 \cdot 0.5 = 30$ units of rice. Japan enjoys 110 electronics and $30 + 30 = 60$ rice, both 10 units more than in (d).

	<i>Japan</i>	<i>India</i>
<i>Rice</i>	60	50
<i>Electronics</i>	110	30

Please report any typos, mistakes, or suggestions for improvement to kmarinakis@smu.edu.sg.