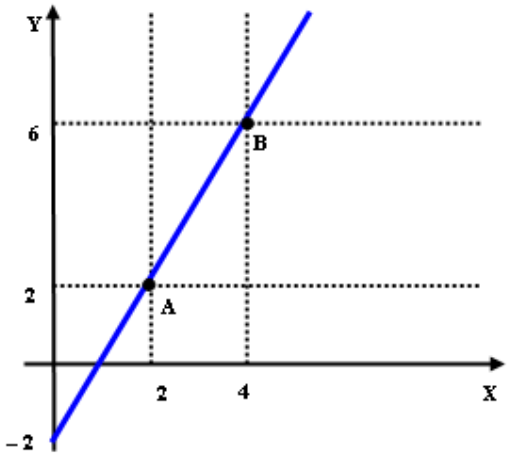
Economics 101
Homework #1 Answer Key
Spring 2009

1. Math Review

a. The drawing is as follows:



b. There are several ways of getting the equation.
The simplest one is as follows. We are looking for the equation of a line which **always** have the following form: ***Y = m * X + b*** where ***m*** is the slope of the straight line and ***b*** is the y-intercept of the straight line. To write the equation we need to find the values for *m* and b. Since both the points **A** and **B** are on the line, then:

$$2 = m * 2 + b$$
$$6 = m * 4 + b$$

Consider the first equation. Then:

$$2 - 2m = b$$

Plug that value of **b** into the second equation:

$$6 = 4m + (2 - 2m)$$

Then:

$$6 = 4m + 2 - 2m$$
$$6 = 2m + 2$$
$$6 - 2 = 2m + 2 - 2$$
$$4 = 2m$$

Finally:

$$m = 2$$

Then:

$$2 - 2 * 2 = b$$
$$2 - 4 = b$$
$$b = -2$$

In this way, the equation of the line is given by:

$$\mathbf{Y = 2X - 2}$$

This is just one possible way of solving it. If you are used to another one, that's fine.

The slope is the value we called **m** before. Thus, the slope is **2**.

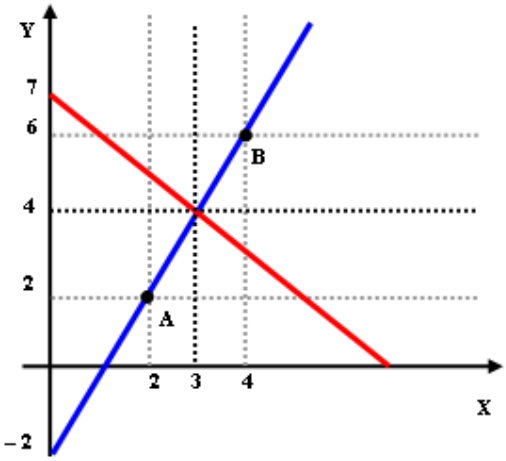
The Y intercept is the value we called **m** before. Thus, the Y intercept is **–2**.

The X intercept can be obtained by asking: For which value of X it is true that the value of Y is 0? We can express that question as follows:

$$\mathbf{0 = 2X - 2}$$
$$\mathbf{2 = 2X}$$
$$\mathbf{1 = X}$$
$$\mathbf{X = 1}$$

The X intercept is **1**.

c.



d. We have the following equations:

$$\mathbf{Y = 2X - 2}$$
$$\mathbf{Y = 7 - X}$$

The intersection will be given by:

$$\mathbf{Y = Y}$$
$$\mathbf{2X - 2 = 7 - X}$$
$$\mathbf{2X - 2 + 2 = 7 - X + 2}$$
$$\mathbf{2X = 9 - X}$$
$$\mathbf{2X + X = 9 - X + X}$$
$$\mathbf{3X = 9}$$
$$\mathbf{3/3\ X = 9/3}$$
$$\mathbf{X = 3}$$

We can obtain now the value of **Y** in the first equation or in the second one. We'll try with the first one:

$$\mathbf{Y = 2*3 - 2}$$

Y = 6 – 2

Y = 4

We can check now with the second one:

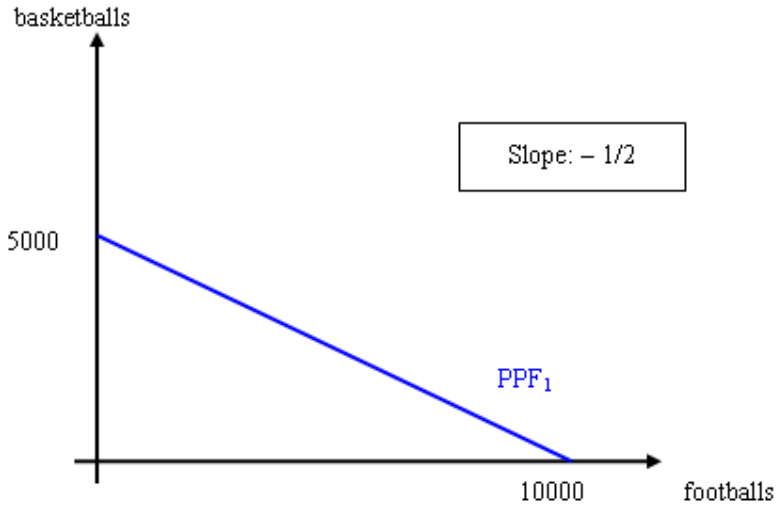
Y = 7 – 3

Y = 4

Then, the intersection is found at the point **(3 , 4)**

2. Production Possibility Frontier and Opportunity Cost

a.



The factory can produce 500(workers)*20(# of footballs produced by each worker per day) =10000 footballs and 500(workers)*10(# of basketballs produced by each worker per day)=5000 basketballs. Slope=(5000-0)/(0-10000)=-1/2

b. In the graph we can see that the y-intercept of the PPF is 5000. So the equation of the PPF is Y= - (½) X + 5000

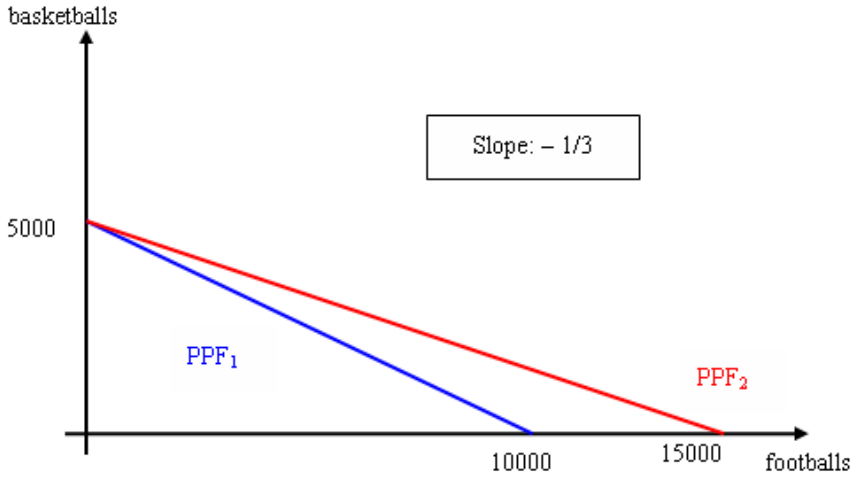
c. 2 footballs. To produce 5000 basketballs, the factory needs to sacrifice 10000 footballs, so the opportunity cost of producing ONE basketball is 10000/5000=2 footballs.

d. 1/2 basketballs. To produce 10000 foottballs, the factory needs to sacrifice 5000 basketballs, so the opportunity cost of producing ONE football is 5000/10000=1/2 basketball.

e. The opportunity cost of 1 football is the same as the absolute value of the slope of the PPF or 1/2 basketball. The absolute value of the slope of the PPF provides a measure of the opportunity cost of producing one more unit of the good measured on the x-axis.

f. A linear PPF has a constant slope, hence constant opportunity cost, while a bowed one has decreasing slope and hence increasing opportunity cost.

g. Now the factory can produce 500(workers)*30(# of footballs produced by each worker per day) =15000 footballs per day. The slope of PPF changes to be (5000-0)/(0-15000)=-1/3. So the equation of the PPF is Y= - (1/3) X + 5000
Technological improvements lead to an outward shift of the PPF as shown in the following graph.



3. Comparative Advantage

a. To solve 20 Economics question, Linda has to sacrifice 10 Biology solutions, that is, to solve 1 Economics question, Linda has to sacrifice 10/20=1/2 Biology answers. So the opportunity cost of solving 1 Economics question for Linda is 1/2 Biology solution. For the same reason, we can determine that the opportunity cost of solving 1 Economics question for Jack is 20/30=2/3 Biology answers.
b. The opportunity cost of solving 1 Biology question for Linda is 20/10=2 Economics solutions. The opportunity cost of solving 1 Biology question for Jack is 30/20=3/2 Economics solutions.
c. Jack has the absolute advantage in both Biology and Economics homework.
d. Since Linda has a lower opportunity cost of doing Economics questions than Jack (1/2<2/3), if they work together, Linda will specialize in Economics answers and Jack will specialize in Biology answers.
e. Jack will trade Biology answers for Linda's Economics answers. The opportunity cost of solving 1 Biology question is 3/2 Economics solutions for Jack. Jack will charge at least 3/2 Economics solutions for every Biology solution. The opportunity cost of solving 1 Biology question is 2 Economics questions for Linda. Linda is at most willing to pay 2

Economics solutions for each Biology solution. Thus the price of 1 Biology answer is between 3/2 and 2 Economics answers.