

**Economics 101**  
**Fall 2012**  
**Homework #1**  
**Due 9/18/12**

**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; otherwise you will not receive full credit.** Good luck!

1. The population of Gotham was 100,000 in 2012.
  - a. In 2013, the population is 110,000. What is the percentage change in the population from 2012 to 2013?
  - b. Suppose the population increased by 30% from 2012 to 2013. What is the population of Gotham in 2013?
  - c. Suppose the population of Gotham has grown by 25% from 2011 to 2012. What was the population in 2011?
2. Answer the following questions:
  - a. (4, 3) and (3, 4) are two points on the same line. What is the equation of this line?
  - b. Suppose the equation of a line is given by  $y = 10 + 2x$ . Also suppose a point on this same line has coordinates (6, z). What is z?
  - c. The point (5, 15) is on a line whose equation is given by  $y = k + 3x$ . What is k? If you know that a point on this line has coordinates (p, 30), what is p?
  - d. What are the coordinates of a point, which is the intersection point of the lines given by  $y = 20 - 6x$  and  $y = 4x - 20$ ?
  - e. Consider the two different temperature scales, Fahrenheit (F) and Celsius (C). They are related by the following equation  $F = 32 + 1.8C$ . Suppose the temperature increases from 212 F to 221 F. What is the percentage change in the temperature in Celsius?
3. Consider the line given by the equation  $y = 10 + 2x$ .
  - a. Suppose you want to shift each point on this line down by 10 units. What is the equation of the new line? Does it intersect the original line? Draw the original and the new line on one graph.
  - b. Suppose you want to shift each point on this line to the right by 10 units. What is the equation of the new line? Does it intersect the original line? Draw the original and the new line on one graph.

4. Suppose two friends—Jon and Sam—live in a deserted fortress in the bitter cold North. They need to produce swords and axes in order to defend themselves from wild animals. Jon has to work for 2 hours to produce a sword and for 5 hours to produce an axe. Sam needs 10 hours to produce a sword, but only 1 hour to produce an axe. Every day, each friend devotes 20 hours to the production of the two weapons. Use this information to answer the following questions.

- How many hours does Jon need to produce 5 swords? How many hours does Sam need to produce 5 swords?
- How many axes can Jon produce in 1 hour? How many axes can Jon produce in 10 hours?
- Assuming Jon only works on swords, how many swords can he produce in 20 hours? Assuming Jon only works on axes, how many axes can he produce in 20 hours?
- Assuming Sam only works on swords, how many swords can he produce in 20 hours? Assuming Sam only works on axes, how many axes can he produce in 20 hours?
- Fill out the following table:

|     | Opportunity cost of 1 sword<br>(in terms of axes) | Opportunity cost of 1 axe<br>(in terms of swords) |
|-----|---|---|
| Jon |   |   |
| Sam |   |   |

- Who has the absolute advantage in producing swords? Who has the absolute advantage in producing axes?
- Who has the comparative advantage in producing swords? Who has the comparative advantage in producing axes?

5. Another pair of friends—Kat and Peet—live in an isolated forest. They can only feed themselves by hunting deer and gathering berries. The following table shows how many hours each friend needs to catch one deer or gather a pound of berries. Assume Kat and Peet each have 12 hours every day to hunt and gather.

|      | Hours of labor needed to<br>catch one deer | Hours of labor needed to<br>gather one pound of berries |
|------|--|---|
| Kat  | 1 hour of labor                            | 2 hours of labor  |
| Peet | 3 hours of labor                           | 4 hours of labor  |

- Using the above information, draw the production possibilities frontier (PPF) of each friend on two separate graphs. Make sure to label your axes, putting deer on the x-axis and berries on the y-axis.
- Who has the absolute advantage in hunting deer? Who has the absolute advantage in gathering berries?
- Who has the comparative advantage in hunting deer? Who has the comparative advantage in gathering berries?
- What is the acceptable range of trading prices for 1 deer in terms of pounds of berries? Would both sides agree to trade if the price is 1 pound of berries for 1 deer?
- What is the acceptable range of trading prices for 1 pound of berries in terms of deer? Would both sides agree to trade if the price is 1/2 deer for 1 pound of berries?
- On a third graph, draw the joint PPF of Kat and Peet—that is, their PPF if they decide to specialize and combine their production.