## Economics 102

Spring 2018
Answers to Homework \#1
Due 2/8/2018
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. Good luck!

Please remember to

- Staple your homework before submitting it.
- Do work that is at a professional level: you are creating your "brand" when you submit this homework!
- Do not submit messy, illegible, sloppy work.
- Show your work to get full credit.

1. You are given two pairs of coordinates that have a linear relationship. The two pairs of coordinates are $(x, y)=(13,48)$ and $(27,90)$.
a. Find the expression of the line (Line 1) that goes through these two points in y-intercept form.
b. In this linear relationship, if the level of $x$ decreases by 66 , what is the resulting change in $y$ ?
c. There is another linear relationship represented by the following expression:

$$
(\text { Line 2): } y=97-5 x
$$

Find the $(\mathrm{x}, \mathrm{y})$ solution that represents the intersection of these two lines.
d. Now Line 1 is shifted in such way that for every $x$ value, the $y$ value is 21 units larger, at the same time Line 2 is shifted in such way that for every $y$ value, the $x$ value is 7 units smaller. Represent these shifts in a clearly labeled graph measuring X along the horizontal axis and Y along the vertical axis. In your graph represent both the initial lines (Line 1 and Line 2) and the new lines (Line 1' and Line 2'). Find the coordinates for the new intersection of these two new lines (Line 1' and Line 2').
2. The price of money is called the interest rate. Suppose that when the interest rate is $4 \%$, the demand for loans is $\$ 23,000$ and when the interest rate is $2 \%$ the demand for loans is $\$ 28,000$. Assume the relationship between the quantity of loans demanded (L) and the interest rate (r) is linear.
a. Write an equation for this relationship in L-intercept form.
b. What would the equation for this relationship be if it was written in r-intercept form?
c. What is the amount of loans demanded at the interest rate of $10 \%$ ? What is the amount of loans demanded when the interest rate is $20 \%$ ?
d. What is the level of interest rate above which no one would find it worthwhile to borrow money?
3. On May 22, 2010, a developer named Laszlo Hanyecz bought two large pizzas worth $\$ 40$ using 10,000 units of a then-little-known digital currency called "bitcoin". On Nov. 18, 2017, the trading price for one unit of bitcoin (BTC) reached $\$ 10,000$ for the first time.
a. What is the approximate percentage change in the trading price of bitcoin from May 22, 2010 to Nov. 18, 2017? Show your work in finding your answer for this question.
b. Suppose that the price for a large pizza rose by $25 \%$ from May 22, 2010 to Nov. 18, 2017. How many large pizzas can he buy with 10,000 units of bitcoin in Nov. 18, 2017 ?
4. Wenqi, Erika and Wentao make bagels (B) and cups of coffee (C) for the ECON 102 students during the week. They all have linear production possibility frontiers. Wenqi knows that he can make $(C, B)=(41,15)$ and $(13,29)$ or any other combination of the two goods that lie on the line containing these two points. Erika knows that the maximum number of bagels she can make is 52 and the maximum number of cups of coffee she can make is 78 . Wentao knows that he must give up 3 bagels for every cup of coffee he makes. Wentao is currently producing 18 bagels and 17 cups of coffee.
a. Represent the production possibility frontiers for Wenqi, Erika and Wentao in three clearly labeled graphs. Please measure cups of coffee (C) on the horizontal axis and bagels (B) on the vertical axis.
b. Write out the B-intercept form expressions of the individual PPFs for Wenqi, Erika and Wentao.
c. Who has the absolute advantage in producing bagels (B) and cups of coffee (C)?
d. Who has the comparative advantage in producing bagels (B) and cups of coffee (C)?
e. Construct Wenqi, Erika, and Wentao's joint PPF in a clearly labeled graph. Please measure cups of coffee (C) on the horizontal axis and bagels (B) on the vertical axis. Identify the yintercept, the x-intercept, and the coordinates of any "kink points" in your graph.
f. Write out the expression (that is, the equation) and the corresponding range for each segment of the joint PPF.
g. If the three-person economy of Wenqi, Erika and Wentao is making 100 bagels (B) efficiently, how many cups of coffee (C) is the economy currently making? How many bagels (B) are made by each person?
h. Use the number line approach to illustrate the acceptable range of trading prices for one cup of coffee (C) in terms of bagels (B) for Wenqi, Erika and Wentao.

