Homework II

due Friday, September 8th in class

1. CPI I (2 points) Assume that apples cost $0.50 in 2005, $1 in 2006, and $1.50 in 2007, whereas oranges cost $1 in 2005, $0.50 in 2006, and $1 in 2007. Suppose that 10 apples and 5 oranges were produced in 2005, 5 apples and 10 oranges were produced in 2006, and 6 apples and 11 oranges were produced in 2007. Calculate the CPI for 2005, 2006 and 2007, using 2005 as the base year. Calculate inflation between 2005 and 2006 and between 2006 and 2007. (Hint: use the same basket (2005))

2. CPI II (2 points) Go to the Bureau of Labor Statistics website and find table “Relative Importance of Items in the Consumer Price Index.” Look at that table and find three items for which the relative importance is very different from your own. Write down which good/services they are, what the weight assigned by the BLS is, and what is your approximate weight for that good/service.

3. Unemployment I (2 points) Assume that the adult population of the United States is 191.6 million, total employment is 117.6 million, and 9.4 million are unemployed. Calculate the labor participation rate and the unemployment rate.

4. Unemployment II (1 point) Now suppose that there is a change from the previous question and that total employment is 116.9 million and that 8.5 million people are unemployed. The resulting unemployment rate is 6.8 percent. Has the situation in the country improved? Explain

5. Marginal Products (3 points) Find expressions for marginal products of labor \((MPL)\) and capital \((MPK)\) for each of the following production functions:

   (a) \(F(L) = \frac{1}{2}L\)
   (b) \(F(K, L) = 3K^{0.3}L^{0.7}\)
   (c) \(F(K, L) = AK^\alpha L^{1-\alpha}\), where \(0 < \alpha < 1\)

6. Marginal Products II (3 points) Assume that the production function in an economy is given by \(Y = AK^{1/3}L^{2/3}\), where \(Y\) is GDP, \(K\) is capital stock, and \(L\) is labor. The parameter \(A\) is equal to 9. Assume also that capital is 100, labor is 800, and both capital and labor are paid their marginal products.

   (a) What is the value of GDP \((Y)\) in this economy?
   (b) What is the real wage of labor?
   (c) What is the real rental price of capital (the amount of output paid per unit of capital)?
7. **Neoclassical Theory of Distribution I (3 points)** Use the neoclassical theory of distribution to predict the impact on the real wage and the rental price of capital of each of the following events. Use graphs to support your predictions.

(a) a wave of immigration increases the labor force.
(b) an earthquake destroys some of the capital stock.
(c) a technological advance improves the production function.

8. **Neoclassical Theory of Distribution II (4 points)** According to the neoclassical theory of distribution, the real wage earned by any worker equals that worker’s marginal productivity. Let’s use this insight to examine the incomes of two groups of workers: farmers and barbers.

(a) Over the past century, the productivity of farmers has risen substantially because of technological progress. According to the neoclassical theory, what should have happened to their real wage?
(b) In what units is the real wage discussed in part (a) measured?
(c) Over the same period, the productivity of barbers has remained constant. What should have happened to their real wage?
(d) In what units is the real wage in part (c) measured?
(e) Suppose workers can move freely between being farmers and being barbers. What does this mobility imply for the wages of farmers and barbers?
(f) What do your previous answers imply for the price of haircuts relative to the price of food?
(g) Who benefits from technological progress in farming - farmers or barbers?