Economics 222
Assignment 1
due May 18th

1. The following question asks you to find several missing values in the national accounts. You are given the following data:

$$\begin{aligned} Y &= 100, & PDI &= 800 \\ I &= 80, & NFP &= 50 \\ C &= 700, & T &= 320 \\ G &= 100, & TR &= 65 \end{aligned}$$

a) What is national saving?

b) What is private saving?

c) What is the value of net government income?

d) What is the value of net exports?

2. Real interest rates are affected by the fact that nominal interest income is taxable. Suppose that interest income is taxed at rate t for all savers.

a) If $i = 8\%, t = 0.50$ and $\pi^e = 3\%$, what is the expected after-tax real interest rate?

b) You decide to invest in a real return bond (a bond that guarantees a constant before-tax real interest rate). If $r = 5\%, t = 0.50$ and $\pi^e = 3\%$, what is the expected after-tax real interest rate?

c) The inflation rate turned out to be only 2%. Which investment would have been more advantageous?

3. The economic structure of cities and rural areas is usually different. For this problem assume that there is one city and one rural area. In the city the production function of the manufacturing sector is given by: $Y = AK^{0.5}N^{0.5}$ and $A = 4$, $K = 256$ and the labor supply is $N^s = 64$. In the rural area the agricultural production function is given by: $Y = AL^{0.5}N^{0.5}$, where $A = 2$, $L = 400$ (L stands for land) and the labor supply is: $N^s = 100$.

a) Initially these two sectors are independent from each other. Find the equilibrium real wage in each sector.

b) Now assume that labour is free to move across sectors. What will be the employment and real wage in each sector in this case? (Hint: a worker will move from one sector to another if the real wage is higher in the other.)

c) The city's Mayor decides to tax individuals from the rural area who work in the city in order to finance a road linking the two areas. Their wage income will be taxed at rate $t = 0.25$. No other group of workers will be taxed. What will be the employment and real wage in each sector?

4. The government of Honduras announces its budget for the next two years. The government won't have any debt at the end of the second year. The expenditures announced were $G = \$200$ in the first year and $G = \$220$ in the second year. Honduras has initially an external debt $D = \$100$. The world interest rate (at which the government and individuals can freely borrow or lend) is $r = 0.10$. Also assume that individuals seeks perfect consumption smoothing across both periods and finally that income is $Y_1 = \$1000$ for the first year and $Y_2 = \$1210$ for the second year.

a) What will be consumption in each period?

b) What will be national saving in the first period if the external debt is paid back only during the second period?

c) Assume that the world interest rate increases to $r' > 0.10$ and that the taxes in the first period are \$200. How this will affect the consumption of individuals?

5. A plumber entrepreneur considers investing in laser operated tools to increase his productive capacity. The production function for these tools is: $Y = 48T^{0.5}$. The real interest rate is $r = 0.05$ and the maintenance costs for these sophisticated instruments are $m = 6\%$ per year. The tools depreciate at the low rate of $d = 0.01$. They are sold at \$100 a piece.
a) What will be the entrepreneur desired tools stock?

b) Our plumber is currently paying an annual \$3600 rent to stock his equipment in a small warehouse. If the maintenance costs for the warehouse are $m = 7\%$ annually and $r = 0.05$, what is the maximum price the entrepreneur would be willing to pay to acquire the warehouse instead of renting it?

6. The saving and investment curves for Japan and the USA are:

$$\begin{array}{llll} S^{USA} & = -10 + 15r & I^{USA} & = 90 - 5r \\ S^{JAP} & = 15 + 10r & I^{JAP} & = 45 - 10r \end{array}$$

a) First, consider both countries to be closed economies. What is the real interest rate in each country?

b) Now assume that both countries are large open economies. Can you find the world real interest rate and the current account of each country? (assume NFP = 0 for both countries).

c) If the U.S. government decreases its spending, how would that affect saving and investment in both countries?