

## Macroeconomics, 1st module, academic year 2004-2005

### Introduction to Macroeconomics

#### Problem set 1

Due: September 22, 23 (in section).

I. Mankiw, 5<sup>th</sup> edition. Chapter 2: problems 7, 9. Chapter 3: problems 1, 2.

II. Other problems:

1. Assume that the production function is given by:  $Q=Q(K,L)=AK^\alpha L^{1-\alpha}$ ,  $0<\alpha<1$ . The capital stock in the economy ( $K$ ) is fixed at  $K_0$ .

- Derive the marginal product of labor  $L$ .
- Derive the demand for labor as a function of the real wage  $w$ .
- Derive the equilibrium in the labor market assuming that the supply of labor is fixed and given by  $L_0$ .
- Derive the real wage in market equilibrium. How does it depend on the stock of capital, the supply of labor and the technological level  $A$ ?
- Derive the equilibrium output  $Q$ .
- Derive the total wage bill in the economy. What is its share in national income (output)? Is this share affected by the other variables in the system? Explain.
- Assuming that the rest of the income is going to capital, what is its share?

2. Assume that the individual allocates his time between work (in order to obtain income to purchase consumption goods) and leisure,

- Show the optimal allocation between consumption  $C$  and leisure  $L$  in the framework of indifference curves and the budget line, when the real wage is given by  $w$ .
- Assume that the government imposes an arbitrary lump-sum tax ("head tax"). How will this affect the budget line? The optimal allocation?
- How will the head tax affect the supply of labor, assuming the leisure is a "normal" good?
- How will the above tax affect the real wage in the market equilibrium? Use diagram.

3. Same as in question 2 except that now the government imposes a relative income tax (a tax proportional to income). How will this affect the individual and the market equilibrium? Use appropriate diagrams.

Reading: S&L, Ch. 4.