**Advanced Microeconomics – Fake Exam**

1. Consider the essay “Should robots be taxed?”. Assume that the utility function of each individual is

where . This means individuals would inelastically supply labor because there is no disutility of leisure. Suppose that each individual has 1 unit of labor available.

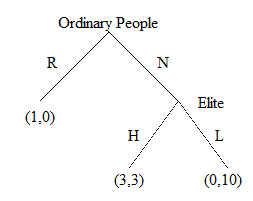
The rest of the model is the same. To be specific, is the ratio of type individuals so that . The production technology of the final good is where

According to the robot production technology, units of robots cost where is a technological constant

1. Compute the Pareto-efficient allocation that maximizes the simple sum of utilities:
2. Compute the laissez-faire (no-taxation) competitive general equilibrium.
3. Now let us put taxation into the market system. Assume, identical to the original paper, that the government imposes an ad valorem tax on robots. All firms and individuals maximize their objectives given the prices and in the usual fashion. Compute the market equilibrium for any given level of tax . (Hint: This is almost identical to part b above, except taxation.)
4. In part c, the market equilibrium depends on the tax rate. Show that the tax rate that maximizes the amount of public good, , also maximizes:

in equilibrium.

1. Assume that the government can also tax labor income as described in the paper. What would be the optimal level of robot tax in that case? Explain. (Hint: The answer is very simple).
2. Consider two groups of people, the Elite () and the Ordinary People (), in a given society. owns all the wealth and controls the political system. is the clear majority in the population. Both and are well-organized so that each one of them can act as a single player. The actions available to are and which denote legislating High or Low taxes, respectively. If takes the action , then shares its wealth with . Under , taxes are low so that inequality is high and keeps its wealth. The actions available to are and , which mean Revolting and Not Revolting, respectively. If chooses the action , then most of the wealth is lost but successfully expropriates the remaining wealth. Under , it is business as usual and the actions of directly materialize without any intervention by .
3. This strategic interaction is modelled as a dynamic game below in Figure 1 below. The crucial assumption is that is the first player. Under these conditions, find all the mixed and pure strategy Nash equilibria.

  
Figure 1.

1. Find all the SPNE (including the mixed strategy SPNE). Are they Pareto-efficient?
2. Solve part (b) above for the game below in Figure 2 where is the first player.

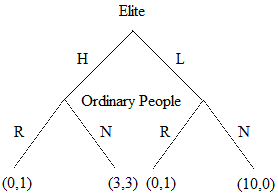


Figure 2.

1. Why does the equilibrium change in part c compared to part b?
2. Now consider an initial stage where and decide which of the games in Figure 1 and 2 they would play before their actions. They are essentially discussing who would be the first player. What would be the result?
3. Consider two firms ( and ) whose technologies are given by the constant marginal costs, and . These firms produce a homogenous good whose (inverse) demand function is given by:

where is the lowest price chosen by Firm 1 and 2 and is the demand by the consumers. Each firm chooses and as the price of the good they produce.

1. Find the Bertrand equilibrium.
2. If a scientist finds a new technology that reduces the marginal cost to 10, what is the maximum amount that Firm 1 would pay for this new technology?
3. Answer the same question for Firm 2.
4. What would be the equilibrium level of price, when the scientist sells this technology to the highest bidder?