**Mathematical Economics 2020 Summer Term Fake Exam**

Name/Surname/Student ID#:

1. Consider an economy where Ahmet and Hakan consume two goods, x and y. Assume that the utility function of Ahmet is

and the utility function of Hakan is

The initial endowments of Ahmet is . The initial endowments of Hakan is . The prices of x and y are and .

1. Find the competitive equilibrium.
2. Draw the Edgeworth box of this economy and show the competitive equilibrium and the initial endowments.
3. The equilibrium is efficient. Why? Explain.
4. Assume an individual has the utility function , where is the consumption and the is leisure. Since individual can work 16 hours per day, her labor supply is . The price of is , and the wage is .
5. Write the budget constriant.
6. Compute the marginal rate of substitution of leisure for consumption.
7. Find the wage rate that would equate labor supply to 8 hours.
8. The US has one of the most unequal distribution of income with a Gini of 0.5. Now suppose that three individuals represent the US economy so that

represents the distribution of average income in the US. According to the federal law, the minimum wage is $24K per annum which means (because half of the population works). GDP per capita in the US is $60K:

1. Find and .
2. Draw the Lorentz curve.
3. Consider an economy of three people, Each individual has income given by

Individuals enjoy after tax income and a public good financed by tax revenues

The utility of each individual is

1. Find the most preferred for each individual.
2. Which tax rate is the Condorcet winner?
3. Suppose that two political parties and propose denoted by and . What should each party propose if their objective is to maximize the number of votes it gets. (Hint: Each voter would vote for her most preferred proposal.)

5) Consider a a teacher and a student. The teacher chooses whether to make a simple quiz or not. The student chooses whether to study or not before the class. Their pay-offs are given in the matrix below. Assume A<B and C>0. Moreover, a>c and b<0. Compute the optimal frequencies of studying and making a quiz.

Teacher

|  |  |  |
| --- | --- | --- |
|  | **Quiz** | **No quiz** |
| **Study** | a, A | b, B |
| **Rest** | c, C | 0, 0 |

Student

1. Consider the problem of İnci and Jale as we discussed in the class. Suppose that the utility function of İnci is

and the utility of Jale is

Both of them have 24 hours available to work or enjoy as leisure. The price of consumption is and the hourly wage is , just like we discussed in the class.

1. Find the marginal rate of substitution for İnci and Jale. Equate MRSl,c to w/p.
2. Write the budget constraint for İnci and Jale.
3. Find the optimal consumption and leisure for İnci and Jale using your answers from part a and part b. (Hint: Note that and because İnci and Jale solve symmetrical problems.)
4. Put your consumption and leisure answers into the utility fucntions of İnci and Jale. This gives the maximum utility of İnci and Jale.
5. Interpret the last result.
6. Suppose that the prevalence of European ancestry in Turkey is 30%. 23andMe is a private company that offers genetic tests which determine ancestry with 95% accuracy. If your 23andMe test tells that you have an European lineage, what is the probability that your grandparents come from Europe?