Problem Set 1

1.) The following data (number of individuals) are available for a country:

- Population: 181,512
- Employed Males: 60,704
- Unemployed Males: 4,595
- Employed Females: 47,857
- Unemployed Females: 3,932
- Males out of labor force: 20,116

Determine the following labor market indicators for this country:
(a) Labor force participation rate
(b) Unemployment rate
(c) Employment rate (employment–population ratio)
(d) Number of persons out of labor force
(e) Unemployment rate of males
(f) Employment rate of females

2.) Individuals switching from employment to unemployment and vice versa do not represent the only flows in a labor market. Describe additional important flows.

3.) The unit labor costs of Germany decreased over the last 20 years relative to other OECD countries as it is found in the study by Dustman et al. (2014). Which mechanisms may explain this development?

4.) Freddy Lazy receives each week 100 Euro as dividends on his stocks. Not working he is just as happy as working one hour per week and receiving a total income of 105 Euro or working two hours per week and receiving a total income of 112 Euro.

   a) What is Freddy's reservation wage assuming discrete hours choices? (Use a graphical argument)
   
   b) Would Freddy accept work with an hourly wage of 5.50 Euro?
   
   c) Due to a recession, Freddy's dividends decline. How does his reservation wage change?
5.) (Borjas, 2010, Problem 2.6.) Shelly’s preferences for consumption and leisure can be expressed as

\[ U(C, L) = (C - 200) \times (L - 80) \]

This utility function implies that Shelly’s marginal utility of leisure is \( C - 200 \) and her marginal utility of consumption is \( L - 80 \). There are 168 hours in the week available to split between work and leisure. Shelly earns 5 Dollar per hour after taxes. She also receives 320 Dollar worth of welfare benefits each week regardless of how much she works.

a) Graph Shelly’s budget line.

b) What is Shelly’s marginal rate of substitution when \( L = 100 \) and she is on her budget line?

c) What is Shelly’s reservation wage?

d) Find Shelly’s optimal amount of consumption and leisure.

6.) This problem involves the static labor supply model. Assume the following utility function for an individual:

\[ U = x + L^{(\beta)} \]

with \( L^{(\beta)} = \begin{cases} \frac{L^{(1-\beta)}}{\beta} & \text{for } \beta \neq 0 \\ \ln(L) & \text{for } \beta = 0 \end{cases} \)

where \( x \) denotes the consumption good and \( L \) leisure. The budget constraint is given by

\[ p \cdot x = V + w \cdot H, \]

where the available time \( T \) is divided into \( H \) hours of work and \( L \) hours of leisure \((T = L + H)\). Furthermore, \( V \) denotes nonlabor income, \( w \) the hourly wage, and \( p \) the price of the consumption good. Consumption expenditure \( C \) is given by \( C = p \cdot x \).

a) Determine the marginal utility of leisure. Which values can the parameter \( \beta \) take in order that the utility function is quasi–concave?

b) Derive the labor supply function for an interior solution \((0 < H < T)\). Check the second order condition. Determine the ceteris paribus effect of an increase in the wage \( W \). Is the direction of the wage effect unambiguous? What is the level of labor supply for the following parameters: \( \beta = 1/3, p = 4, w = 1, T = 16, V = 20 \)?

c) Determine the reservation wage. What is the level of labor supply when the price increases to \( p = 9 \) compared to the previous situation?

d) Demonstrate the Slutsky decomposition for the labor supply function in this problem. Discuss the direction of the income effect.

e) Under what conditions does the individual work during the entire available time \( H = T \)?
7.) (Borjas, 2010, Problem 2.5) You can either take a bus or drive your car to work. A bus pass costs 5 Dollar per week, whereas driving your car to work costs 60 Dollar weekly (parking, tolls, gas, etc.). You spend half-an-hour less on a one-way trip in your car than on a bus. How would you prefer to travel to work if your wage rate is 10 Dollar per hour? Will you change your preferred mode of transportation if your wage rate rises to 20 Dollar per hour? Assume you work five days a week and time spent riding on a bus or driving a car does not directly enter your utility.

8.) Discuss the following claim and determine whether it is true, false, or uncertain: “Leisure must be an inferior good if the labor supply curve is backward bending for an individual (i.e. for low wages the labor supply curve exhibits a positive slope and for high wages a negative slope).” Explain your answer.

9.) (Borjas, 2010, Problem 2.3) Tom earns 15 Dollar per hour for up to 40 hours of work each week. He is paid 30 Dollar per hour for every hour in excess of 40. Tom faces a 20 percent tax rate and pays 4 Dollar per hour in child care expenses for each hour he works. Tom receives 80 Dollar in child support payments each week. There are 168 hours in the week. Graph Tom’s weekly budget line.

10.) (Borjas, 2010, Problem 2.7) Explain why a lump sum government transfer can entice some workers to stop working (and entices no one to start working) while the earned income tax credit can entice some people who otherwise would not work to start working (and entices no one to stop working).

11.) In the debate on tax reforms in Germany, it is common place to argue that marginal taxes should be reduced. At the same time, the possibilities for tax deductions should be cut in order to keep tax revenues at the same level as before the reform. Analyze the incentive effects of such a reform in the context of the static labor supply model. Assume that the government succeeds in keeping the tax revenues constant.

12.) The new government of a country with a strictly proportional income tax considers the introduction of a minimum monthly income of 1000 Euro as transfer payment for those individuals without another source of income. In order to finance this policy, the tax rate will be increased from 15% to 20%. For a typical worker, analyze labor force participation and hours worked before and after the policy change. Discuss whether the likely effects differ between the group of male workers in the age group 25 to 54 years and the age group 55 to 64 years assuming mandatory retirement at age 65.
13.) From an old exam: Consider the neoclassical static labor supply model.

a) Describe and illustrate graphically the static labor supply model. Distinguish between participation and hours worked. What is the reservation wage? [15 credits]

b) Merzonia is a country with a proportional income tax with a tax rate of 30% and welfare payments providing a nonlabor income of €800 per month for each household. The government of Merzonia wants to strengthen work incentives by the combination of two policy reforms. First, the government lowers the nonlabor income to Euro 500 per month for those nonemployed who are capable of working. Second, the government introduces a tax deduction of Euro 1500 per month. The government expects that together these policy changes have no impact on the government budget. Based on the static labor supply model, what are the likely consequences of the reform on the labor force participation rate and the hours worked in Merzonia? Hint: To solve this problem make appropriate further assumptions if necessary. [15 credits]

14.) From an old exam: Consider the static labor supply model.

a) Disincentivia is a country in which everyone who does not work receives a transfer payment of €800. A person who works receives no transfer payment at all. There is no income tax in Disincentivia. The government wants to enhance work incentives and implements the following reform: First, the transfer payment is reduced to €500. Second, if a person works, he or she may keep 50 cent of each euro earned plus the transfer payment (so the withdrawal rate is 50%) until he or she works so much that he or she is better off keeping all earnings and not taking any transfer payment. Third, an income tax of 20% for earnings above €2,000 is introduced (i.e. there is a tax deduction of €2,000). Describe and illustrate graphically the likely consequences of the reform using the static labor supply model. Will the government succeed in increasing the labor force participation rate and the hours worked in Disincentivia? [30 credits]