ECONOMICS 480: ANALYSIS OF LABOR MARKETS

Spring 2016

Problem Set 1
Total points in the problem set: 100

Due: Tuesday Feb 9, before class

1. (1 pt) Which is not a decision made by potential workers in the United States?

   (a) Deciding whether or not to participate in the labor force.
   (b) Determining how to divide one's time between work and leisure.
   (c) Choosing how much to produce to maximize firm profit.
   (d) Choosing how much education to receive.
   (e) Deciding which occupation to pursue.

2. (1 pt) Which of the following is not a leading actor in labor markets?

   (a) Consumers
   (b) Firms
   (c) Worker
   (d) Government
   (e) Scientists

3. (1 pt) An upward-sloping labor supply curve implies that

   (a) a firm can always hire more workers, even without increasing the wage.
   (b) more workers are willing to work when wages are low.
   (c) more workers are willing to work as the market wage increases.
   (d) labor supplied is fixed.
   (e) there is a continuously increasing demand for labor.

4. (1 pt) A firm's labor demand curve is typically

   (a) a vertical line.
   (b) a horizontal line.
   (c) upward-sloping.
   (d) downward-sloping.
   (e) associated with a slope equal in absolute value to the slope of the labor supply curve.

5. (1 pt) The typical labor supply curve

   (a) is u-shaped.
   (b) equals the marginal product of labor.
   (c) slopes up.
   (d) slopes down.
   (e) depends on the size of the firm.

6. (10 pts) The State of Michigan has a population of 9,883,000. In November, 2015, there were 4,763,700 people who are in the labor force, 243,721 unemployed.

   (a) (3 pts) What is the labor force participation rate in Michigan in November, 2015?

   (b) (3 pts) What is the unemployment rate?

   (c) (4 pts) What is the employment-to-population ratio?

7. (10 pts) Show by contradiction that indifference curves do not cross.

8. (15 pts) Tom earns \$15 per hour for up to 40 hours of work each week. He is paid \$30 per hour for every hour in excess of 40. Tom faces a 20 percent tax rate and pays \$4 per hour in child care expenses for each hour he works. Tom receives \$80 in child support payments each week. There are 110 (non-sleeping) hours in the week.

   (a) (4 pts) What is Tom's endowment point? In other words, if Tom chooses not to work at all, what is his consumption level and hours of leisure?

   (b) (4 pts) For all hours Tom works up to his first 40, what is his after-tax, after-child care wage? If he works 40 hours, what is his consumption level and hours of leisure?

   (c) (4 pts) For all hours Tom works over 40, what is his after-tax and after-child care wage? If he works for 110 hours and has no leisure at all, what is his consumption level?

   (d) (3 pts) Graph Tom's weekly budget line.

9. (15 pts) Shelly's preferences for consumption and leisure can be expressed as

$$U(C, L) = (C\text{–}100) \times (L\text{–}40)$$

   This utility function implies that Shelly's marginal utility of leisure is C–100 and her marginal utility of consumption is L–40. There are 110 (non-sleeping) hours in the week available to split between work and leisure. Shelly earns \$10 per hour after taxes. She also receives \$320 worth of welfare benefits each week regardless of how much she works.

   (a) (4 pts) Graph Shelly's budget line.

   (b) (3 pts) What is Shelly's marginal rate of substitution when L = 100 and she is on her budget line?

   (c) (3 pts) What is Shelly's reservation wage? (Recall that the reservation wage is defined as the MRS when working no hours)

   (d) (5 pts) Find Shelly's optimal amount of consumption and leisure.

10. (10 pts) Over the last 100 years, real household income and standards of living have increased substantially in the United States. At the same time, the total fertility rate, the average number of children born to a woman during her lifetime, has fallen in the United States from about three children per woman in the early twentieth century to about two children per woman in the early twenty-first century. Does this suggest that children are inferior goods? Explain your answer.

11. (20 pts) Judy has utility function

$$U = CL.$$

    Non-labor income $V = 0$. Total time is $T = 10$. Wage $w = 1$. Therefore, her budget constraint is

$$C = 10 - L$$

(a) (4 pts) Solve for the optimal labor supply and consumption. (hint: first solve for the marginal utility of leisure and marginal utility of consumption, then use the formula: $MRS = \frac{MU_L}{MU_C} = w$). In this case, the marginal utility of leisure, MU_L, is equal to $\frac{\partial U}{\partial L} = \frac{\partial(CL)}{\partial L} = C$, and the marginal utility of consumption, MU_C, is equal to $\frac{\partial U}{\partial C} = \frac{\partial(CL)}{\partial C} = L$. (You should be able to use simple calculus to calculate MU_L and MU_C!!)

(b) (4 pts) Graph the budget constraint, optimal choice, and the indifference curve that is tagent to the budget constraint.

(c) (4 pts) Now suppose that wage increases to $w' = 2$. What is the new budget constraint? Solve for the new optimal labor supply.

(d) (4 pts) In the graph you draw in part (b), draw the new budget constraint, the new optimal choice, and the new indifference curve that is tagent to the new budget constraint. Show the income effect and substitution effect

(e) (4 pts) We can decompose the effects of higher wage on leisure into the income effect and substitution effect. Does the income effect increase leisure or reduce leisure? Does the substitution effect increase leisure or reduce leisure? Which effect dominates in this case? Explain your answer.

12. (15 pts) The market consists of Allen and Bernard. Allen has the labor supply curve described in the following function:

$$w = 10 + 2h_A,$$

while Brenda has the following labor supply curve

$$w = 20 + 2h_B.$$

Note that we can rewrite the labor supply curves as

$$\begin{aligned} h_A &= \frac{1}{2}(w - 10) \\ h_B &= \frac{1}{2}(w - 20) \end{aligned}$$

(a) (5 pts) What is Allen's reservation wage? What is Bernard's reservation wage?

(b) (5 pts) What is the market labor supply curve?

(c) (5 pts) Draw the market labor supply curve.