Homework 5 & 6 – Answer Key

1. The following table shows the hourly production of a firm depending on how many workers it employs.

<table>
<thead>
<tr>
<th>Number of Workers</th>
<th>Total Output</th>
<th>Marginal Revenue Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>----</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
<td>8</td>
</tr>
</tbody>
</table>

a. Fill in the marginal revenue product for each worker (hint: you may want to calculate marginal physical product first). **Marginal revenue product is calculated by taking marginal physical product * price. Marginal physical product is just the change in total output when one more worker is hired.**

b. The firm can sell as many units of the product as it wants for a price of $2. In the space below, draw the firm’s demand curve for labor. (Put the number of workers on the horizontal axis and the hourly wage rate on the vertical axis. For any given wage, show the number of workers the firm wants to hire.)

We find the demand curve for labor from the marginal revenue product curve. The marginal revenue product curve comes from multiplying the marginal physical product times the price of the product. The first worker makes 10 units of the product that can be sold for 10*$2=$20 so by hiring the worker, the firm is making an extra $20 in revenue. They will be willing to hire the worker for a wage up to $20.

c. If the wage rate is $10, how many workers should the firm hire? Why?

**For a wage rate of $10, they will be willing to hire 6 workers.** The 6th worker has a marginal physical product of 5 units of the product that can be sold for $10 ($2 * 5 = $10). The firm is not willing to hire the 7th worker because the marginal revenue product of that worker is only $8 (4*$2=$8); they would be paying $10 in wages for a worker who is only bringing them $8 in revenue. Basically, firms hire workers until the marginal revenue product equals the wage rate – in this case that means hiring 6 workers.
2. What will be the effect of each of the following on the supply curve for labor, demand curve for labor, equilibrium wage, and equilibrium number of workers for auto manufacturing?
   a. Machines, which are used in place of workers, become more efficient. 
      The increase in the productivity of other inputs in production shifts the demand curve for labor in. 
      The supply curve for labor does not shift. The equilibrium wage rises and the number of workers falls.
   b. Workers take training classes that make them more productive in manufacturing autos. 
      The increase in productivity of workers shifts the demand curve for labor out. The supply curve for labor does not shift. The equilibrium wage falls and the number of workers increases.
   c. The price of autos increases. 
      The increase in the price of the product increases the marginal revenue product of workers and thus the demand curve for workers shifts out. The supply curve for labor does not shift. The equilibrium wage falls and the number of workers increases.

3. For each of the following terms, explain in your own words what the term means and give an original example (not from lecture or the book) of how this results in people getting paid different wages.
   a. compensating wage differentials In order to make up for poorer working conditions or more job risk, a person gets paid a higher wage to do a job that require the same skill as a different job. An example is that construction workers who work outside usually get paid more money than craftsmen who do inside work because there is a higher likelihood the person doing outside jobs will be laid off in the winter. (In general, one of the reason construction workers are generally well paid is because of the uncertainty of the job – it is not uncommon to go months without a job.)
   b. human capital Workers who have more education or other skills (human capital) get paid higher wages. Even though both jobs teach students, University professors get paid more money than high school teachers because we had to go to graduate school and get a Ph.D. to get a job as a professor.

4. What is the difference between the signaling theory and the human capital theory of why education results in higher earnings?
   The human capital theory states it increases wages because of the skills acquired in education make you a more productive worker. The signaling theory states that education increases wages because it sends a signal to employers of the type of employee you will be (rather than because you acquire skills that make you a more productive worker).

5. We discussed a variety of theories of discrimination. Which theories can result in discrimination persisting over time? Explain.
   Discrimination CANNOT persist over time under the neoclassical model with perfect competition because firms that discriminate will have higher wage costs, lower profits, and eventually be driven out of business. However, if there is not perfect competition, then discrimination may be able to persist with those firms that discriminate earning a lower profit. Discrimination CAN persist over time under the consumer prejudice theory because the higher prices prejudice consumers are willing to pay cover the business’ higher wage costs. Discrimination also CAN persist in the social network theory as long as there continues to be segregation in social networks since social networks are so closely tied to our job opportunities. We did not discuss if discrimination can persist under statistical discrimination, but the answer is that we expect discrimination to affect initial wages (when information is unknown) but not to affect later wages once the employer finds out the full information about the employee.

6. Tell me the two things you found most interesting or unexpected about the government’s role in redistributing income (government programs and taxes). Tell me the two things you found most interesting or unexpected about poverty (what it is, who is in poverty, and poverty rates).
   Answers will vary.
7. Your next-door neighbor likes to cook sauerkraut and sausages every night. However, the smell of sauerkraut and sausages cooking makes you sick. How is this an example of an externality? An externality is when the benefits or costs of an activity affect not only the person who buys the product but also affect a third party. When your neighbor cooks these foods, it has a negative effect on you and thus is an externality.

b. How does Coase suggest we can solve the problem? Coase thinks we should assign property rights – he says the problem is that no one has legal property rights to the smell of the air. If we assign property rights to you, you can force your neighbor to pay you every time he cooks. If we assign property rights to your neighbor, you will have to pay him to NOT cook. It doesn’t matter who we assign property rights to – either you or your neighbor – either way we will get the efficient amount of smelly cooking.

c. How does Pigou suggest we can solve the problem? Pigou would put a tax on cooking these foods. Every time your neighbor cooks, he would have to pay the government a tax. If the tax is set equal to how much you are harmed by the cooking (the marginal external cost), your neighbor will choose the efficient amount of cooking. Note, though, he is not choosing the efficient level because he cares about you – rather, since he pays a tax equal to how much you are harmed, when he considers the tax he is essentially considering the marginal external cost.

d. Do we (society) want there to be zero amount of sauerkraut and sausages cooked? What is the efficient amount (I am looking for a formula, not an actual number). Despite what you might think about sauerkraut and sausage, the answer is that we DON’T want zero cooked. Your neighbor benefits from cooking this. However, if there were no intervention, he would cook too much from society’s perspective because he would not consider the harm he is causing you. The efficient amount is where the marginal benefit to society = marginal cost to society (including the cost to you).

8. Explain what each of the following terms means:

Dow Jones Industrial Average When you hear reports of what has happened to the stock market, usually the report is telling what happened to the Dow Jones Industrial Average – a group of 30 companies that is considered representative of the market in general. (You are not actually being told what happened to all the stocks on the market but only these few stocks.)

dividend This is a payment from a company to its stockholders. If a person owns stock and the company issues a $1 dividend, for example, the person receives $1 for each share of the stock he or she owns. A dividend is one of two ways that you can make money on a stock. The other way to make money is if the price of the stock is higher when you sell the stock than when you bought the stock.

liquidity This is a measure of how easily your investment can be converted to cash. If an investment is highly liquid, it is easy to convert into cash (such as a savings account); if it is not very liquid it is hard to convert into cash (such as equity in your house). All else equal (including risk and tax advantages), the more liquid an investment is, the lower the expected return to the investment.

stock If you own a stock, you are part owner of a company. Companies issue stock as a way to raise cash. After the initial offering of stocks by a company, shares of the stock are bought and sold by individuals and not by the company.

bond We did not cover this.

mutual fund A mutual fund is a group of individual stocks that is managed by a fund manager. If you buy a mutual fund, you are essentially joining many other people who also invest in the mutual fund in pooling your money to buy a large variety of stocks. You don’t determine what stocks to buy or when to sell them – the fund manager makes those decisions for the fund. While a mutual fund is investing in stocks, it is generally considered less risky than just buying one stock because the investment is in a variety of different stocks.
9. Your father-in-law owns a company that does lawn care. While you are visiting over Thanksgiving, since you are a budding economist he asks your advice about two problems he is facing. Your father-in-law can buy a new lawn mower that is state of the art. If he buys this lawn mower, with his current workforce he can do $5,000 additional business per summer for the next five summers, the expected life of the lawnmower. (In other words, if he buys the mower, his only additional costs are the cost of the lawnmower which he pays up front and his additional revenue will be $5,000 per year for the next five years and after five years the lawnmower won’t bring him any additional revenue.) He says to you, “Look, the price of the lawnmower is only $22,000 and I will make $25,000 in revenue so obviously I should buy it.” Assuming the interest rate is 5%, how do you respond to his statement? Is he right or is he wrong to buy the machine? Show your calculations and explain to him (in plain terms a non-economist would understand) why you are advising him as you do.

We did not cover this.

10. Multiple-choice questions. Answers will vary. You will get to see my examples next week on the test!!