Answers to Even Numbered Review Questions and Problems

Chapter 2

Problem

4. Suppose the adult population of a city is 9,823,000, and there are 3,340,000 persons who are not in the labor force and 6,094,000 who are employed.
   a. Calculate the number of adults who are in the labor force and the number of adults who are unemployed.
   b. Calculate the labor force participation rate and the unemployment rate.

Answer:  
a. Number in labor force = number in population less those not in the labor force
   \[ = 9,823,000 - 3,340,000 = 6,483,000 \]

Number unemployed = number in labor force minus number employed
   \[ = 6,483,000 - 6,094,000 = 389,000 \]

b. Labor force participation rate = (labor force/population) \( \times \) 100
   \[ = \left( \frac{6,483,000}{9,823,000} \right) \times 100 \]
   \[ = 66.0\% \]

Unemployment rate = (unemployed/labor force) \( \times \) 100
   \[ = \left( \frac{389,000}{6,483,000} \right) \times 100 \]
   \[ = 6.0\% \]

Chapter 3

Review Questions

2. Assume that wages for keyboarders (data entry clerks) are lower in India than in the United States. Does this mean that keyboarding jobs in the United States will be lost to India? Explain.

Answer: Indian data entry clerks will be substituted for American ones only if the ratio of their wage to their marginal productivity is lower. Thus, it is not wage alone that affects the incentives to substitute; marginal productivity is also critical.

6. Suppose the government were to subsidize the wages of all women in the population by paying their employers 50 cents for every hour they worked. What would be the effect on the wage rate women received? What would be the effect on the net wage employers paid? (The net wage would be the wage women received less 50 cents.)

Answer: Consider a simple competitive labor market in which the demand and supply of women are both expressed in terms of the wage received by women (which, in the absence of any subsidy, is assumed to be equal to the wage paid by employers). Given the demand curve, \( D_0 \), and the supply curve, \( S_0 \), market clearing wage and employment levels will be \( W_0 \) and \( E_0 \), respectively.
Suppose the government now subsidizes employers by paying them 50 cents for every hour women work. Viewed in terms of the wage received by women, the employers’ demand curve will shift up by exactly 50 cents (reflecting the fact that this amount will be paid by the government). At the old market clearing wage received by women, \( W_0 \), the number of women employers want to hire, \( E_2 \), exceeds the number who are willing to work, \( E_0 \). This puts upward pressure on the wage received by women, and this wage rises until the excess demand for labor is eliminated. This equilibrium occurs at the wage rate \( W_1 \), and the employment level \( E_1 \).

It is clear from the figure that the wage received by women increases by less than 50 cents as long as the supply of labor curve is not vertical (i.e., as long as labor supply is responsive to wages). Indeed, the more responsive labor supply is to the wage rate, the less the women’s wage will rise. Since the wage paid by employers now equals the wage women receive less the 50-cent subsidy, it is also clear that the wage paid by employers declines (by 50 cents minus the increase in the wage women receive).

It is important to stress to students that one would reach identical conclusions if one analyzed the subsidy in terms of the wage employers pay. If supply and demand curves are drawn in terms of this variable, a 50-cent-an-hour subsidy for women would shift the female labor supply curve down by 50 cents. At the old wage paid by employers, the supply of female labor would now exceed the demand. Downward pressure would be placed on the wage paid by employers and it would fall by less than 50 cents (as long as labor supply was responsive to the wage). As a result, the wage received by women would rise by 50 cents less the fall in the wage paid by employers.

### Problems

2. The marginal revenue product of labor in the local saw mill is \( \text{MRP}_L = 20 - 0.5L \), where \( L \) = the number of workers. If the wage of saw mill workers is $10 per hour, then how many workers will the mill hire?

**Answer:** The mill will hire workers until \( \text{MRP}_L = W \cdot 20 - 0.5L = 10 \) when \( L = 20 \) workers.

4. The output of workers at a factory depends on the number of supervisors hired (see below). The factory sells its output for $0.50 each, it hires 50 production workers at a wage of $100 per day, and needs to decide how many supervisors to hire. The daily wage of supervisors is $500 but output rises as more supervisors are hired, as shown below. How many supervisors should it hire?

<table>
<thead>
<tr>
<th>Supervisors</th>
<th>Output (units per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11,000</td>
</tr>
</tbody>
</table>
The firm needs to compare the marginal cost to the marginal revenue of hiring an additional supervisor. The marginal cost is always $500 for each extra supervisor. The marginal revenue is the number of additional units produced times the price of output.

<table>
<thead>
<tr>
<th>Number of Supervisors</th>
<th>MC</th>
<th>MR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$500</td>
<td>$0.50 \times 3800 = $1900</td>
</tr>
<tr>
<td>2</td>
<td>$500</td>
<td>$0.50 \times 3200 = $1600</td>
</tr>
<tr>
<td>3</td>
<td>$500</td>
<td>$0.50 \times 1500 = $750</td>
</tr>
<tr>
<td>4</td>
<td>$500</td>
<td>$0.50 \times 700 = $350</td>
</tr>
<tr>
<td>5</td>
<td>$500</td>
<td>$0.50 \times 400 = $200</td>
</tr>
</tbody>
</table>

The firm will hire three supervisors since the marginal revenue generated from hiring the third supervisor exceeds $500 but the marginal revenue generated from hiring the fourth supervisor is less than $500.

6. The table below shows the number of cakes that could be baked daily at a local bakery, depending on the number of bakers.

<table>
<thead>
<tr>
<th>Number of Bakers</th>
<th>Number of Cakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
</tr>
</tbody>
</table>

a. Calculate the marginal product of labor.
b. Do you observe the law of diminishing marginal returns? Explain.
c. Suppose each cake sells for $10. Calculate the marginal revenue product of labor.
d. Draw the marginal revenue product of labor curve, which is the demand curve for bakers.
e. If each baker is paid $80 per day, how many bakers will the bakery owner hire, given that the goal is to maximize profits? How many cakes will be baked and sold each day?

Answer: a.
The marginal product of labor (MPₐ) is calculated in the third column, using the following formula:

\[ MPₐ = \frac{\Delta \text{(Number of cakes)}}{\Delta L} \]

b. Yes, the marginal product of labor declines as more bakers are hired.

c. The marginal revenue product of labor (MRPₐ) is calculated in the fourth column, using the following formula:

\[ MRPₐ = MPₐ \times P \]

d. The demand for labor is the MRPₐ curve:

e. If each baker is paid $80 per day, 2 bakers would be hired and 18 cakes would be baked and sold daily.

**Chapter 6**

**Review Question**

2. Evaluate the following quote: “Higher take-home wages for any group should increase the labor force participation rate for that group.”

**Answer:** This quotation is correct, because for labor force participation decisions, the substitution effect dominates the income effect. The strength of the income effect is relatively weaker when the initial hours of work are smaller. When initial hours of work are zero—as is the case when a person is out of the labor force—then the income effect is zero if leisure is a normal good (increased resources cannot induce one to increase the consumption of leisure, since leisure hours are already at their maximum).
8. The Tax Reform Act of 1986 was designed to reduce the marginal tax rate (the tax rate on the last dollars earned) while eliminating enough deductions and loopholes so that total revenues collected by the government could remain constant. Analyze the work incentive effects of tax reforms that lower marginal tax rates while keeping total tax revenues constant.

**Answer:** Reducing the marginal tax rate has the effect of increasing the wage rate, because workers are allowed to keep more from any extra hours worked. Keeping tax revenues constant suggests that workers’ after-tax incomes also remain constant. Thus, the Tax Reform Act tended to increase the wage while keeping workers’ incomes constant—creating a pure substitution effect that tended to increase hours of work.

**Problem**

6. Stella can work up to 16 hours per day at her job. Her wage rate is $8.00 per hour for the first 8 hours. If she works more than 8 hours, her employer pays “time and a half.” Draw Stella’s daily budget constraint.

**Answer:**

Stella’s earnings are equal to the following:

\[\text{Number of hours (within first 8 hours) } \times \$8 + \text{Number of hours (among next 8 hours) } \times \$12.\]

The budget constraint for the first 8 hours of work is the segment to the right of the dotted vertical line at 8 hours. The budget constraint for subsequent hours of work is the segment to the left of the dotted vertical line at 8 hours.