

## How to Study for Classes 15 and 16    The Labor Market

Classes 15 and 16 introduce the demand for labor, the elasticity of the demand for labor, and the determination of wages. The analysis is similar to that of product markets.

1. Begin by looking over the Objectives listed below. This will tell you the main points you should be looking for as you read the chapter.
2. New words or definitions and certain key points are highlighted in italics and in red color. Other key points are highlighted in bold type and in blue color.
3. You will be given an In Class and Homework Assignment to illustrate the main concepts. There are a few new words in this chapter. Be sure to spend time on the various definitions. The teacher will focus on the main technical parts of this chapter. You are also responsible for the cases and the ways by which each case illustrates a main principle.
4. When you have finished the text, the Test Your Understanding questions, and the assignments, go back to the Objectives. See if you can answer the questions without looking back at the text. If not, go back and re-read that part of the text. When you are ready, take the Practice Quiz.

## Objectives for Classes 15 and 16    The Labor Market

At the end of Classes 15 and 16, you should be able to answer the following questions:

1. What are the characteristics of a perfectly competitive resource market?
2. What is the “**marginal revenue product**”? What is the “**marginal resource cost**”?
3. Explain how a profit-maximizing employer would choose the number of workers to hire. Why is the marginal revenue product curve the same as the demand curve for labor?
4. From the demand curve for labor by one employer, how is the demand for labor determined?
5. What is the “**wage elasticity of demand for labor**”?
6. What are the factors that will determine if the demand for labor is relatively elastic or inelastic? Name four factors and explain each.
7. Use the answer to question 8 to analyze the effects of a minimum wage law or a comparable worth law.
8. What are the factors that will affect the marginal revenue product of a worker? (In particular, what will cause this curve to shift?)
9. Use your answer to question 1 to explain why different people earn different wages in a market (for example, why do some people earn very high incomes?).
10. What is meant by “**general training**”? By “**specific training**”? What effect does each have on wage determination?
11. What is “**statistical discrimination**”? What effects does it have?
12. Explain the reasons that a college education increases one’s income over one’s lifetime.
13. What is “**human capital**”?
14. What is the **screening or signaling** theory?
15. Explain how **experience** increases one’s income over one’s lifetime.
16. What do companies give special rights on the basis of **seniority**?
17. Summarize by giving some hypotheses as to why men earn more than women or why whites earn more than minorities.

## Classes 15 and 16    **The Labor Market** (latest revision August 2004)

### 1. The Demand for Labor

We now shift our attention to the labor market. Even though we are considering human beings, we treat our analysis of the labor market as similar to any other market. We analyze the labor market by **looking at the demand for labor on the part of employers and the supply of labor on the part of workers**. The resulting price we shall call the **“wage”** (the “wage” will include all forms of compensation to the workers, including health benefits and social security). Let us begin our analysis by examining the demand side of the market.

As we did with products, **we will begin by assuming that the labor market operates under perfect competition**. Remember that there are four characteristics to a perfectly competitive market. *First, and most important, there are so many buyers (employers) and also sellers (workers) that no one can affect the price (i.e., wage) alone*. All employers hire labor in a market in which the wage is given to them. They can hire as many or as few workers as they desire at that going wage. Similarly, all workers search for jobs at the going market wage. If a person desires a higher wage, no employer will hire that person. And the person will never ask for a lower wage since it is not necessary to do so to find employment. *Second, there is perfect information*. All workers and all employers know what the market wage is and also know all other important information. The workers know the characteristics of all jobs while the employers know the characteristics of all prospective workers. *Third, there are no barriers to entry or exit*. All workers are free to leave their current employment and can easily find other employment. All employers are free to fire a worker and can easily find other workers to hire. *Fourth, there are identical "products"*. All employers are essentially the same and all workers are essentially the same. The model of perfect competition was developed at a time when most workers were unskilled. With large numbers of unskilled workers and employers hiring people who were basically unskilled, the conditions for perfect competition could hold. Of course, for other types of workers, perfect competition is not realistic. But this simplification does allow us to understand much about the way labor markets work. We shall make our analysis more realistic later.

How many workers will an employer choose to hire? Remember that, using **rational decision-making**, we do not ask the question this way. The question is: should we hire one worker? If yes, should we hire a second worker? And so on. We continue asking this question until the answer is that we should not hire an additional worker. So, should we hire one worker? To answer this, we must answer two questions: what is the **marginal benefit** and what is the **marginal opportunity cost** of that worker? *If we have perfect competition, the marginal opportunity cost is equal to the wage*. This means that, if the going wage for a construction worker is \$20,000 per year, that the employer can hire as many construction workers as desired at that wage. Each additional worker will cost the employer an additional \$20,000 per year. This is commonly called the **“marginal resource cost”**. (Do not confuse “marginal resource cost” with the “marginal cost”.) What is the marginal benefit from hiring an additional worker? Each additional worker adds to production. In the example of our construction company, each additional construction worker contributes to the building of an additional number of homes. However, the employer is not interested in just homes. The employer is interested in revenues.

So we must multiply the additional number of homes produced by the price received for those homes. We will call the marginal benefit from hiring an additional worker the “*marginal revenue product*”. (Do not confuse the “marginal revenue product” with the “marginal revenue”.) *It is calculated as the marginal physical product times the price.* (Remember that the marginal physical product is the additional production resulting from the hiring of an additional worker.) Assume that I am the additional worker. If the company hires me, I add ten units to production. If each of those ten units sells for \$1, I am responsible for adding \$10 of new revenue for the company. (In this example, it is assumed that the company also sells its product in perfect competition --- no matter how many units of the product have already been sold, each additional unit will sell for \$1.)

First, let us examine this procedure with a simplified case. Consider the following situation:

Labor	Total Physical Product	Marginal Physical Product	Price	Marginal Revenue Product
1	10	10	\$1	\$10
2	21	11	1	11
3	33	12	1	12
4	44	11	1	11
5	54	10	1	10
6	63	9	1	9
7	71	8	1	8

Notice that this production function has similar properties to the one developed earlier. Marginal physical product rises from worker #1 to worker #3. This is *increasing marginal returns* and results from specialization and division of labor. After worker #3, the marginal physical product falls. This is *the law of diminishing marginal returns* and results from the limited capital. Notice also that this company sells its product in perfect competition. We know this because, whether it sells 10 or 71, the price of the product is still \$1. If the company also hires in a perfectly competitive labor market and the market wage is \$9, how many workers should the company hire? The first worker adds 10 units to production, each of which sells for \$1. Therefore, the first worker adds \$10 to the company’s revenues while adding only \$9 to the company’s costs. The company’s economic profits rise by \$1 if worker #1 is hired. Having made the decision to hire worker #1, go on to worker #2. This worker adds 11 units to production, each of which sells for \$1. Therefore, this worker adds \$11 to the company’s revenues while adding only \$9 to the company’s costs. The company’s economic profits rise by \$2 if this worker is hired. You can continue in this manner. *As long as the addition to revenue (marginal revenue product) is greater than the addition to cost (marginal resource cost and equal to the wage), the company is better off hiring that worker.* When the process is completed, this company will hire 6 workers. *The company should hire workers up to the point at which the marginal revenue product equals the marginal resource cost (which equals the wage).* Remember that we do count in the worker for which the marginal revenue product and the marginal resource cost are equal. The company would surely not hire the seventh worker. This worker would add only \$8 to the company’s revenues while adding \$9 to its costs.

Now let us return to the case of our construction company developed in earlier chapters. Review the example where the following **production function** for our company was developed:

Number of Workers	Average Physical Product	Marginal Physical Product
7	.14	.14
13	.15	.16
18	.17	.20
24	.17	.16
31	.16	.14
39	.15	.12
48	.14	.11
58	.13	.10
69	.13	.09
81	.12	.08
94	.11	.077
108	.11	.071

In our example, the construction company sold homes in a perfectly competitive market at a price of \$200,000 each. However, the addition to profit from selling another home would only be \$180,000. This is so because, while the price was \$200,000, each home also had \$20,000 of natural resource costs. Our construction company also hired workers in a perfectly competitive labor market at a wage of \$20,000. The company's decision would be based on the following calculations:

Number of Workers	Marginal Physical Product	Price	Marginal Revenue Product
7	.14	\$180,000	\$25,200
13	.16	180,000	30,000
18	.20	180,000	36,000
24	.16	180,000	28,800
31	.14	180,000	25,200
39	.12	180,000	21,600
48	.11	180,000	20,000
58	.10	180,000	18,000
69	.09	180,000	16,200
81	.08	180,000	14,400
94	.077	180,000	13,860
108	.071	180,000	12,780

The first group of seven workers produce .14 of a home (since the group of seven workers produce one home together). Because a home brings in \$180,000, **each member of this group** is adding \$25,200 (the number has been rounded off) to the revenues of the company (**the marginal revenue product**). Since each of the workers adds only \$20,000 to the costs of the company (**the marginal resource cost**), the company's profits rise if it hires the first seven workers. Go on to the second group. The second group involves workers 8 through 13. These six workers produce another home. Remember that it takes fewer workers to produce the second home because of **increasing marginal returns** (specialization and division of labor). Therefore, each worker adds 1/6 of a home (.16). Because each home adds \$180,000 to profits, each of these workers adds \$30,000 to the revenues of the company (.16 times \$180,000) --- **the marginal revenue product**. Since each of the workers adds \$20,000 to the costs of the

company (**the marginal resource cost**), the company's profits rise by hiring workers 8 through 13. Go on to the third group --- workers 14 through 18. Each of these five workers is necessary to build an additional home. Therefore, each worker contributes  $1/5$  (.2) of a home. Because the home adds another \$180,000 to the profits, each of these workers contributes \$36,000 (.2 times \$180,000) to the revenues of the company --- **the marginal revenue product**. As each of these workers also add \$20,000 to the costs of the company (**the marginal resource cost**), the company's profits rise by hiring the fourth group. Go on to the next group. And so forth. Go over these numbers carefully. Be sure you see how they were derived.

Let us jump ahead to workers 40 through 48. These nine workers are necessary to produce one home. Remember that it now takes more workers to produce an additional home because of **diminishing marginal returns** (caused by the limited capital). Each of the nine workers adds  $1/9$  (.11) of a home. Because each home adds \$180,000 to profits, each of these workers adds \$20,000 (.11 times \$180,000) to the revenues of the company --- **the marginal revenue product**. As each of these workers adds \$20,000 to the costs of the company --- **the marginal resource cost** --- the profits are the same whether these workers are hired or not. (The nine workers cost \$180,000 together. They build one home. That home earns the employers \$180,000 of net revenue.) Remember though that we do count this group. *We hire workers up to the point at which the marginal revenue product is equal to the marginal resource cost (which is equal to the wage)*. Therefore, we will hire 48 workers. The 48th worker adds just the same amount to the revenues of the company (\$20,000) as this worker adds to the costs of the company (\$20,000). But the company should not hire any additional workers. The next home requires ten workers (worker 49 to 58). Each of these workers increases production by  $1/10$  of a home (.1). Because the home adds \$180,000 to the profits, each of these workers contributes only \$18,000 (.1 times \$180,000) to the revenues of the company --- **the marginal revenue product**. As each worker adds \$20,000 to the costs of the company --- **the marginal resource cost** --- they should not be hired. It would not pay the company to hire worker 49 and pay that person \$20,000 in wages when that person only brings-in \$18,000 to the company.

In order to be consistent with the case of the construction company developed in earlier, some of the numbers used here have been complicated. Go over them carefully. Be sure you see where each number comes from and why 48 workers will be hired. **Remember that 48 workers are necessary to build seven homes; earlier, we determined that seven homes was the number that would maximize the company's profits.** When we first began discussing costs of production, we stated that the company hired 48 workers. Now you can see why it does so. Let us determine if this approach to the hiring decision is at all realistic.

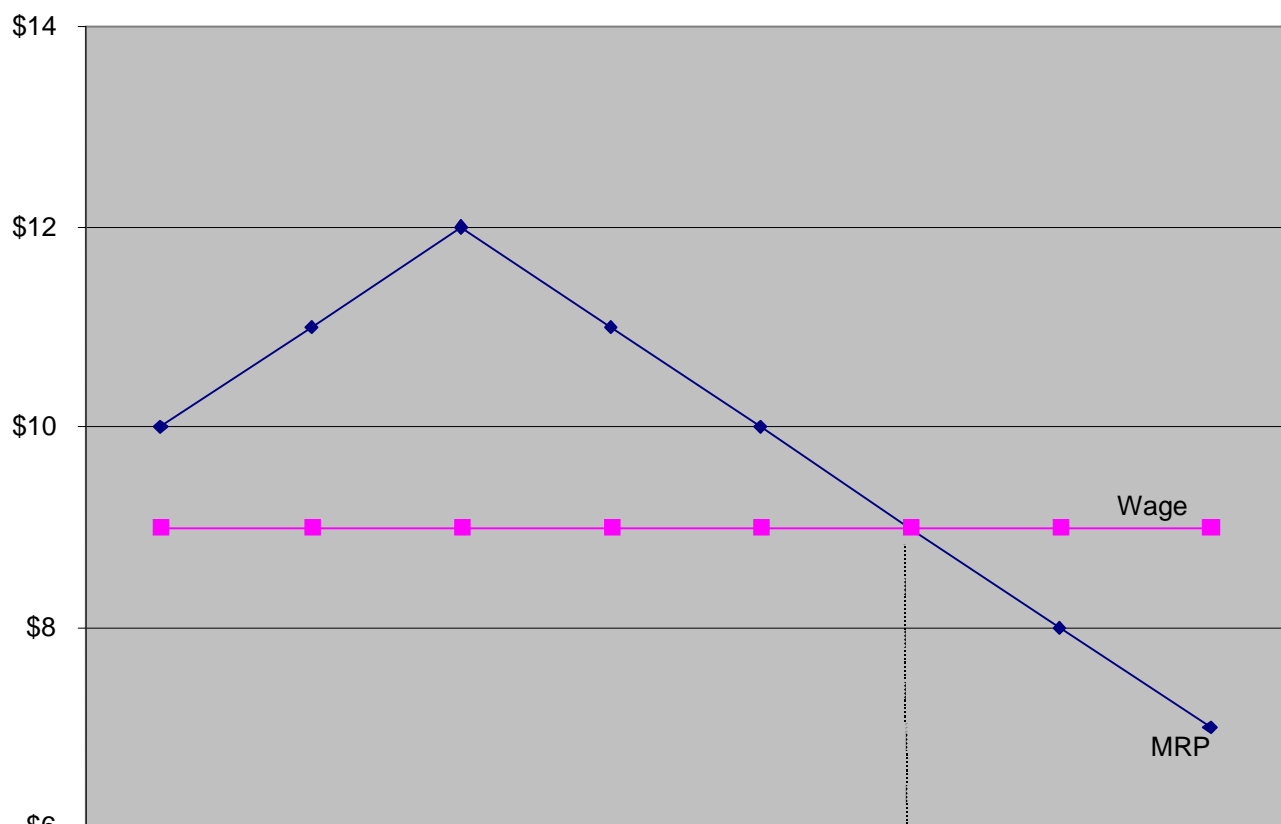
The terms "marginal revenue product" and "marginal resource cost" are not used in everyday talk. If I ask your employer to tell me what your marginal revenue product is, he or she will probably not know what I am talking about. But, even without using the language, employers do think in these terms. This is easiest to see in the case on entertainers and athletes. For example, Ray Romano is paid \$1.8 million for each episode of his television show. Why would anyone pay him that much for one episode of a half-hour show? The answer, of course, is that they expect him to bring in a large number of viewers --- his marginal physical product. The large number of viewers allows the television network to charge higher prices to advertisers. Consider the large number of viewers and the high prices charged to advertisers, the television network expects Ray Romano to contribute at least \$1.8 million in additional revenue each episode --- his

marginal revenue product. Why would the New York Yankees pay a player \$25 million per year to play third base? The answer, of course, is that this player is expected to win many games. Team victories contribute to increased attendance at baseball games and an increased number of viewers on television. The increased number of people attending the games and the increased number of television viewers represent his marginal physical product. Each of these pays a price. For those attending the games, the price is the price of the ticket plus the team's share of parking and concessions. For viewers on television, the price involves the extra amount that can be charged to advertisers. The baseball team must expect that this player will contribute more than \$25 million per year in additional revenue --- his marginal revenue product --- for it to be willing to pay him this much each year.

Notice that there is an implied value judgment in this line of reasoning (normative economics). A person's wage is equal to his or her marginal revenue product. If you earn more than I earn, it must be because your marginal revenue product is greater. This could only occur for two reasons: (1) you are physically more productive than I am or (2) you produce a product of greater value to society than I do, as evidenced by the higher price it commands. If this is so, then you deserve to be paid more than I do. We shall consider the reasons for earnings differentials more fully in later sections.

Go back to the number set above. If the wage were \$20,000, we said that 48 workers would be hired. Had the wage been \$25,200 or higher per year, how many workers would have been hired? The answer is 31. Had the wage been \$28,800 or higher, how many workers would have been hired? The answer is 24. And had the wage been \$36,000, how many workers would have been hired? The answer is 18. **Notice that the marginal revenue product tells us how many workers will be hired (i.e., bought) at any given wage (i.e., price).** The number of workers hired at any given wage is the definition of the demand for labor. *Therefore, the demand for labor curve is the same as the marginal revenue product curve.* This is shown in the graph.

### Number of Workers Hired



Notice that the marginal revenue product rises (due to increasing marginal returns) and then falls (due to diminishing marginal returns). **The marginal resource cost (equal to the wage) is shown as a horizontal line. This represents the supply of labor to one employer and is perfectly elastic:** the employer can hire as many workers as he or she desires at the going wage of \$20,000. If the employer offered a lower wage, no one would be employed. A higher wage would never be offered because it is not necessary to do so.

If the marginal revenue product curve shows the demand for labor for one employer, it is easy to calculate the demand for labor curve for all employers. **Simply add together the demand for labor on the part of all companies who hire the same type of worker** (these may or may not be in the same industry). The demand for labor basically slopes down and to the right because of the law of diminishing marginal returns.

Remember that the marginal revenue product is calculated by multiplying the price of the product (a constant) by the marginal physical product. The marginal physical product, which gives the curve its downward slope, is related to the marginal cost. When the marginal physical product is rising (falling), the marginal cost is falling (rising). They are mirror opposites.

### Test Your Understanding

In the following simplified case, fill in the table:

Labor	Total Product	Marginal Physical Product	Price	Marginal Revenue Product
1	100		\$10	
2	220		\$10	
3	320		\$10	
4	400		\$10	
5	460		\$10	

If this company hires workers in a perfectly competitive labor market at a market wage of \$800, how many workers will it choose to hire? \_\_\_\_\_

### Test Your Understanding

Earlier, you were given a case concerning an orange grove. The following table described the relation between the number of pounds of oranges sold per year and the number of workers hired. This was the **production function**. You were asked to calculate the marginal physical product (MPP).

<u>Number of Workers</u>	<u>Number of Pounds Per Year</u>
0	0
1	10,000
2	40,000
3	90,000
4	130,000
5	160,000
6	180,000
7	192,000
8	198,000
9	200,000
10	200,000
11	190,000

You were also given that the price of oranges was \$0.60 per pound and that the wage paid to each worker was \$12,000 per year. Assume that oranges are sold in a perfectly competitive product market and that the workers are hired in a perfectly competitive labor market.

In the table below, calculate the **marginal revenue product** & the **marginal resource cost**.

Workers	MPP	Price	Marginal Revenue Product	Wage	Marginal Resource Cost
1		\$0.60		\$12,000	
2		\$0.60		\$12,000	
3		\$0.60		\$12,000	
4		\$0.60		\$12,000	
5		\$0.60		\$12,000	
6		\$0.60		\$12,000	
7		\$0.60		\$12,000	
8		\$0.60		\$12,000	
9		\$0.60		\$12,000	
10		\$0.60		\$12,000	
11		\$0.60		\$12,000	

This company will hire \_\_\_\_\_ workers because \_\_\_\_\_.  
(Compare this to the number hired the first time this case was introduced.)

## 2. Elasticity of Demand for Labor

Notice again that the demand for labor is a downward-sloping line. But, as with the demand for products, knowing this is not enough. We want to know the amount the demand for labor will change if there is a given change in the wage paid to workers. In other words, we want to know **the wage elasticity of demand for labor**. This concept is no different than the elasticity concepts developed earlier. *The wage elasticity of demand for labor is the percentage change in the quantity demanded of labor (i.e., in the number of people hired) if there is a given percentage change in the wage.* As a formula, it is:

$$\frac{\text{Percentage Change in Demand for Labor}}{\text{Percentage Change in the Wage}}$$

We use the same terminology as we did earlier. If this number is more than zero but less than one, the demand for labor is **relatively inelastic**. If this number is more than one, the demand for labor is **relatively elastic**. If the number equals one, the demand for labor is **unit elastic**. If the number equals zero, the demand for labor is **perfectly inelastic**. And if the number is infinitely large, the demand for labor is **perfectly elastic**. As we draw the graph, **the more inelastic (elastic) is the demand for labor, the steeper (flatter) is the demand curve.**

The factors that determine whether the demand for labor will be relatively elastic or relatively inelastic are basically the same as for any product. Suppose those who work at your college obtain a wage increase of a given percent. What will happen to the number of people employed by the college? Will it decline greatly (relatively elastic) or will it decline only slightly (relatively inelastic)?

*The first factor that determines whether the demand for labor is relatively elastic or relatively inelastic is the existence of substitutes.* When the workers at your college obtain their wage increase, are there substitutes for them? If yes, than many of the current workers will lose their jobs and the demand for labor will be relatively elastic. **One main substitute might be capital goods.** It is possible that the employer may buy machines to replace the workers. Computers could be added to replace clerical people and even to replace teachers. Or take the

case of our construction company. Procedures to build homes in factories and assemble them easily on the site may be developed. **Another substitute might be different workers.** For example, as union workers obtain wage increases, employers often try to hire non-union workers to replace them. This practice has been common among construction workers and musicians. Many American companies have located plants in Mexico to be able to substitute low-wage, unskilled workers for higher-wage, unskilled American workers. **And yet a third “substitute” might be to simply reduce the number of workers and let the remaining workers try to produce more.** For example, teachers might lose their jobs if their wages rose; there would be fewer classes offered for students and each class section would be larger.

*The second factor affecting the elasticity of the demand for labor is time.* This refers to the time to develop substitutes. If the wage rises today, the employer may have no option but to pay the higher wage today. But the employer may try to develop substitutes for the workers. This may take considerable time to accomplish. **Therefore, the demand for labor is more elastic the longer is the time under consideration.** As one example, the wages of coal miners rose greatly during the 1920s as a result of a very strong labor union. Employers had no option at the time but to pay the higher wages. However, they looked for a technology to replace the miners. It took many years to be able to put the new technology into operation. When the new technology --- strip mining --- began to be used after World War II, a very large number of coal miners lost their jobs in a relatively short time. As another example, in the 1960s, farm workers attempted to unionize. Believing that they would be successful and would be able to raise wages, growers began to search for machines that would replace workers in the picking of fruits and vegetables. The problem was that the machine did not know which fruit or vegetable to pick --- it would simply pick everything. Overcoming this required genetically developing a plant so that all of the fruit or vegetables would be in the same stage of ripeness at the same time. This was indeed done for tomatoes. With all tomatoes in the same stage of ripeness, the machine can pick all of them. The tomatoes are picked green so that they will be hard enough that the machine will not squash them. A gas is then injected into the tomato to turn it red before taking it to the market. Similar attempts have been made for grapes and bananas without success.

*The third factor affecting the elasticity of the demand for labor is the cost of labor in relation to the total cost of production.* This is analogous to “price in relation to income” that we considered for products. For the employer, is labor expensive or inexpensive? **The more expensive labor is, the more workers will lose their jobs as their wages rise.** Let us return to the college example. If all workers obtain a 10% increase in their wages, the cost would be very expensive for the employer. Labor represents between 80% and 90% of the total cost of a college. Many of the workers would lose their jobs. The demand for labor would be relatively elastic. Now suppose that only Economics teachers obtain a 10% increase in their wages. Since there are few Economics teachers, the cost to the college would be only a few thousand dollars. This would be inexpensive to a college that has a total cost in the tens of millions. The college would just pay the wage increase. Very few, if any, Economics teachers would lose their jobs. The demand for labor in this case would be relatively inelastic. This example illustrates a phenomenon that causes much dissension in companies --- the workers get a small wage increase while the Chief Executive Officer (CEO) gets a very high wage increase. In total, the workers represent a high portion of the total cost because there are so many of them. The CEO represents only a small portion of the total cost because there is only one CEO --- even though the CEO

may earn more than \$1 million per year.

*The final factor affecting the elasticity of the demand for labor is the price elasticity of the demand for the product.* If the company must pay higher wages to its workers, it would like to get the money back by raising its prices to buyers. If the demand for the product is very inelastic, the quantity demanded will fall very little as the price rises. Because the quantity demanded falls very little, the demand for labor will also fall very little. The demand for labor will be relatively inelastic. On the other hand, if the demand for the product is relatively elastic, the quantity demanded will fall greatly as the price rises. Because the quantity demanded has fallen so much, the number of workers employed will also fall greatly. The demand for labor would be relatively elastic. What would happen if, because the workers at your college obtained higher wages, the college raised the fees that you pay? If you would simply pay the higher fees and continue on as before, then few college employees will lose their jobs (relatively inelastic demand for labor). But if you would significantly reduce the number of classes that you take or not attend the college altogether because of the higher fees, then many employees of the college will lose their jobs (relatively elastic demand).

*In summary, the demand for labor will be relatively inelastic if: (1) there are few substitutes for the workers; (2) there is a shorter time under consideration; (3) the labor represents only a small portion of the total cost of production; (4) the demand for the product produced by the company is relatively inelastic. The demand for labor will be relatively elastic if: (1) there are many substitutes for the workers; (2) there is a longer time under consideration; (3) the labor represents a large portion of the total cost of production; and (4) the demand for the product produced by the company is relatively elastic.*

### Case: The Increase in the Minimum Wage

Until 1996, the national minimum wage was set at \$4.25 per hour. This is a **wage floor**; it was illegal to pay a wage below this. In 1996, the national minimum wage was raised so that it reached \$5.75. At the time of this writing, the national minimum wage is \$6.15 and the minimum wage in California is \$6.75. Many economists have debated the effects of the minimum wage on the labor market. Our analysis above tells us that some workers will lose their jobs, or not be able to find jobs, as the minimum wage is increased. This results from the downward slope of the demand for labor curve. The question is: how many people will lose their jobs? Is this a small or large number? And what happens to the amount the companies must pay in total to their workers? To answer these questions, we need to know the wage elasticity of the demand for workers who are paid the minimum wage. Those affected, of course, are those currently earning less than \$6.75 per hour. (There is no evidence that raising the minimum wage has an effect in raising wages for those already paid above the minimum wage.)

In California in 1994, 5.7% of all workers earned at or below the minimum wage of \$4.25 per hour. However, an additional 11.6% of all workers earned less than \$6.75 and therefore were affected by the new law. Of the minimum wage workers, 22.1% were age 16 to 19, 21.4% were age 20 to 23, and the rest (56.5%) were age 24 and up. California minimum wage workers are older than those in the rest of the nation. Other data describing minimum wage workers in California are that 46.1% of them had less than 12 years of education and 56% were Hispanic. These workers tend to be found as food service workers, sales workers, domestic workers,

laborers, or farm workers. In general, those affected by the new law tend to be young, less educated, minority, and less skilled. However, a large number of those affected do not fall into these categories.

Would the demand for these workers be relatively elastic or relatively inelastic? To answer these questions, consider the factors that determine the wage elasticity of the demand for labor. Are there many substitutes for these workers? If so, who would they be? Do these workers represent a high percent or a low percent of the total cost of production? Is the demand for the products produced by these workers relatively elastic or inelastic? (That is, if the minimum wage rises and, as a result, all companies that are affected raise their prices, will the demand for these products fall greatly or relatively little?) One would guess that the demand for minimum wage workers is relatively inelastic. In general, you will find few substitutes for them. Immigrants may provide one substitute. But, since these are low paying jobs, there will not be a rush of other people to take these jobs. And since many of these jobs are in some form of service, such as retail trade (48% of minimum wage workers are in retail jobs), there are not many machines to replace them. In general, they represent a low percent of the total cost of production --- in large part because their wages are so low. And in general, the demand for the products would be relatively inelastic because the prices of the products are low in relation to income and because all of the companies involved would be raising prices at the same time (reducing the number of substitutes).

Empirical studies tend to confirm the guesses of the last paragraph. **Most estimates of the elasticity of demand for minimum wage workers put the number at 0.2 or 0.3.** This is very inelastic. One recent study estimated the elasticity for California workers at 0.349 for people age 16 to 19, 0.252 for people age 20 to 23, and 0.112 for people age 24 and over. The proposition passed in 1996 to raise the California minimum wage to \$5.75 per hour represented a wage increase of 35% by 1998. Using the estimated elasticities, employment of people age 16 to 19 would fall 4.4%, employment of people age 20 to 23 would fall 1.6%, and employment of people age 24 and older would fall only 0.75%. These declines are quite small. According to this research, 34% of the employment decline would come in retail and wholesale trade, 40% in services, 9% in manufacturing, 4% in agriculture, 5% in government (covered by the minimum wage laws for the first time), and the rest spread over several other industries.

If the demand for minimum wage workers is indeed relatively inelastic, what happens to the total amount the companies must pay for their workers? Since the wages paid rises more than the number of workers employed falls (since this is how the demand for labor can be relatively inelastic), **the total amount the companies must spend on their workers must rise.**

### **Test Your Understanding**

In the early 1990s, **comparable worth** was an important political issue. This meant that workers should not only be paid the same wage for doing the same job, they should be paid the same wage if they did comparable jobs. The courts found that jobs done by men and women were often comparable (as they measured this) but that the wages were commonly higher for jobs done by men. Had comparable worth become national law, **the effect would have been to significantly raise the wages paid to women who work.** Analyze this case. What would be the results of passing comparable worth laws? In doing your analysis, notice that this case is similar to the case of the increase in the minimum wage.

### Internet Assignment

In 2004, there was a proposal in the California legislature to raise the state's minimum wage to \$7.75 per hour. Go to the Internet and read the arguments **in favor of** raising the minimum wage. You can find them at the following sites: <http://www.crisny.org/not-for-profit/unions/minwage5.htm>

Or <http://www.crisny.org/not-for-profit/unions/minwage9.htm>

Or <http://www.crisny.org/not-for-profit/unions/factsheet.htm>

Or <http://www.crisny.org/not-for-profit/unions/min-wage.htm>

You may find other sites, if you wish.

Then, go to the Internet and read the arguments **against** raising the minimum wage. You can find them at the following site: <http://www.self-gov.org/cox02.html>. You may find other sites, if you wish.

Then, go to the following site: <http://www.crisny.org/not-for-profit/unions/la-401.htm>

1. Briefly describe the **Living Wage Ordinance in Los Angeles**.
2. Based on your reading above, what arguments can you give **in favor of** the Living Wage Ordinance? Be sure you show that your answer is derived from Internet readings.
3. Based on your reading above, what arguments can you give **against** the Living Wage Ordinance? Be sure you show that your answer is derived from Internet readings.

### 3. Wage Differences

About two-thirds of all of the income earned in the United States comes from wages and salaries. For many families, wages or salaries generate nearly all of their income. So our question in this section is: "what determines people's wages and salaries?". **Why do some people or some groups earn more income than others?** In answering this question, we shall assume here that wages and salaries are determined in reasonably competitive labor markets. Like other prices, they are determined by demand and supply.

Why do certain athletes or entertainers earn so much income? Alex Rodriguez, the third baseman mentioned earlier, is said to earn in ten years an amount that would take the average doctor 750 years to earn, the average teacher 1,000 years to earn, and the average secretary 6,250 years to earn. In terms of the analysis we have used, this can be easily explained. On the demand side, the marginal revenue product of Alex Rodriguez is expected to be high. The marginal revenue product is the marginal physical product times the price. The marginal physical product (addition to the number of paying customers) is likely to be high because Alex Rodriguez is expected to hit many home runs, drive in many runs, and contribute to many wins. Team wins will significantly increase the number of paying customers. The price people are willing to pay is also reasonably high because the demand for the games of winning baseball teams is high and also because baseball has considerable monopoly power. In addition, the supply is very low because there are not many people with the skills of Alex Rodriguez. High demand and low supply cause the wage to be high. The analysis is similar for any other highly paid athlete or entertainer. However, let us extend the analysis by examining wages differences between groups. Our analysis here can be used for any set of groups. But we shall limit our question in this chapter to: **why do men earn more than women and why has the earnings gap between men and women been closing?**

#### Case: The Earnings Gap Between Men and Women

Through most of the last hundred years, the average woman who worked earned just about 60% of the average man. This 60% ratio was amazingly also found to exist at the time of the

Industrial Revolution (late 18th century) and also in Biblical times. Some of this difference can be explained by the fact that many women worked part-time. But even among full-time workers (working at least 35 hours per week) a substantial gap in earnings existed. In recent years, the earnings of women workers have risen to over 70% that of men (over 80% for full-time workers). Thus, while the gap is closing, a significant gap still remains.

In order to explain the gap in earnings, let us focus on the demand for labor. In reasonably competitive labor markets, workers are paid according to their marginal revenue products. One's marginal revenue product is the product of the price times the marginal physical product. We can focus on each of these.

Let us begin with **the price**. One's wage would be higher if the price of the product one sells is higher. Therefore, one reason for the higher earnings of men might be that the prices of the products they produce are higher. As was noted earlier, men are much more likely than women to work in manufacturing jobs. Until the 1970s or early 1980s, **many manufacturing companies operated in industries in which the companies had market power --- power to raise the price of the products they sell**. These higher prices raised the marginal revenue products of the workers, causing their wages to rise. These workers were most likely to be men. Since the 1970s, competition in many industries has increased. Much of this new competition has come from companies in foreign countries. **Increased competition has taken away much of the power to affect the price**. So one reason for the narrowing of the earnings gap in recent years is the decline in prices caused by the increased competition. **The earnings gap has been narrowing perhaps as much because men have been losing ground as because women have been gaining ground**.

The remainder of our analysis of the earnings differences between men and women will focus on the **marginal physical product**. In physical terms, why is one person or group more productive than another? Let us consider several possibilities.

The most obvious reason for the differences in people's marginal physical product would seem to be **differences in natural ability**. This would include size, strength, intelligence, personality type, and so forth. I am too short to be a basketball player, too small to be a football player, and, no matter how hard I practiced, could never hit major league pitching nor sing well nor play a musical instrument very well. I do not have the personality type to be a successful politician. However, **natural ability plays a small role in the differences in productivity**. And it certainly plays little role in explaining the productivity differences between men and women and virtually no role in differences in productivity between various ethnic groups. Even differences in strength and size have become relatively unimportant as machines have replaced manual labor in many jobs that used to require considerable strength. (There are some sociologists who do argue that genetic endowment is the main reason for the differences in productivity and therefore in earnings. But their argument is not widely accepted.)

Another reason for differences in people's productivity was studied earlier. In the discussion of the production function, it was demonstrated that **workers would be more productive if they had more and better capital per worker to work with**. The American steelworker is more productive than the British steel worker because of more capital --- larger factories, more machines, and so forth. The Japanese steelworker is more productive than the American steel worker not only because they have more capital per worker (much larger factories) but also because they have better capital (i.e., they utilize more modern technology). Today's athletes are

more productive than those of forty years ago in part because there are larger stadiums and in part because of the advances in television and radio programming. (The productivity of athletes is measured in people attending games.) As noted in the last section, men have been more likely than women to work in manufacturing jobs. Since these jobs usually involve large amounts of capital, while the service jobs in which most women work do not, this can explain part of the earnings differences between men and women.

Yet another consideration for differences in people's productivity in their *motivation*. Are there just poorly motivated workers or are there jobs that produce poorly motivated workers? One clue that the problem is with the job, and not with the worker, came in the Fremont area, near Oakland, California. General Motors had a large factory there with over 4000 workers. It was considered the least efficient automobile factory in the country. Finally, General Motors closed the plant. Some time later, General Motors formed a joint venture with Toyota called the New United Motors Manufacturing, Inc. (NUMMI). They opened in the same factory with the **same capital**. They hired back about 2,500 of the **same workers**. They operated the plant on the principles of Japanese management. Today, this plant (which produces Geos) is one of the most productive in the country and almost as productive as the Toyota factory in Japan.

It is clear today that workers have considerable discretion as to how productive they are. Very few people work so hard that they come home totally exhausted every day. Most workers work hard enough to stay employed but know they could work harder if they had to. (This was shown very clearly at the beginning of World War II. Productivity in most American factories was significantly higher in December of 1941 and January of 1942 than it had been in November of 1941. Nothing that normally affects productivity could have changed much in just two months. The difference is that the American participation in the war began at the beginning of December of 1941. Before December, people were just working. Beginning in December, their work affected the survival of the country. Their productivity soared.)

What is it that will motivate workers to be productive in normal times? Most people want to be rewarded for their efforts. They want appreciation. They want the opportunity for advancement. Research shows that workers are more productive if they are able to participate in the decisions that affect their jobs. And, of course, workers want wages. If one asks workers, virtually all will say that they are not paid enough. So what is it about one's wage that affects one's productivity? **Research shows that most people evaluate their wages against reference groups**. We expect some people to be paid more than we are, some to be paid less than we are, and some to be paid about the same. For example, as a teacher, I know I will be paid less than a physician. This does not tend to reduce my productivity. I expect to be paid about the same as another teacher at the same level and to be paid more than teachers at lower levels. If I were to find that teachers at other colleges were earning significantly more than I am, my productivity could be affected greatly.

Ultimately, the main reason for differences in productivity involves **differences in skills**. Skills must be learned. We divide skills into two types. **General skills are skills that can be easily transferred between employers. General training involves the learning of general skills**. If I leave this job and move to another, the skills are still useful on the new job. Reading is the most general skill. Knowing double entry bookkeeping, contract law, and human anatomy are general skills. As a teacher, most of my skills are general. General skills are learned either through **formal education** or through **company training programs**. **Specific skills are those**

*that cannot be transferred between employers. Specific training involves the learning of specific skills.* Knowing the procedures of the company you work for, knowing the nature of the people you work with or the specific nature of the customers, knowing the special characteristics of the product you produce or sell are example of specific skills. Specific skills are learned through **experience on the job**. We will consider formal education first. Then, we will consider experience.

### **Formal Education and Company Training Programs**

**Consider formal education as a financial investment.** When you make the decision to go to college, you sacrifice a certain amount of money for fees, books, and so forth. More important, you sacrifice the income you could have earned by working (or by working more hours than you are currently working). Had you worked full-time, rather than come to the college, we would expect your income to rise over time. This would be true largely because of the importance of on-the-job experience (to be discussed below). Therefore, each additional year that you choose to continue in school requires a larger and larger sacrifice. Once you finish college, you begin your career. You expect that your income will rise as a result of the education you received. And indeed, on average, your income will rise. The gap between the income you would receive with a college education and the income you would receive with only a high school education will continue to widen each year up to about age 55. The gap reached at about age 55 will then persist for the rest of your life.

Consider the total amount that you sacrificed as analogous to putting money into a savings account for each of these years. While the money is in your savings account, it is earning interest at a certain rate. Consider the additional income you received as analogous to taking the money out of your savings account. If you “put in” to your savings account the amount of your total sacrifice each year you are in college, “take out” of your savings account each year the amount of your additional income, and have zero left in your savings account at the time of your death, what interest rate did you earn? (Of course, you are putting the money into your education and not into a savings account. And you are getting your return by having higher income when you work and not by taking the money out of a savings account. But the interest rate idea still holds.) For much of the last 30 years, investing in your education has earned a return averaging around 7% per year after taxes. The return is undoubtedly quite a bit higher than that today. **Your college education is one of the best long-term investments you could make.**

**Notice that you are required to pay for your education.** You do so by paying fees, buying books, and so forth. You also do so by sacrificing income you could otherwise have made. Why does your employer not pay for your education? **The answer is that most of the skills you learn in college are general skills.** This means that they can be easily transferred to a different employer. Employers are afraid that, if they pay for your education, you will just leave and go to another company. The money they spent on your education would be wasted. Employers who will pay for your education are those who are certain that you cannot leave (the military, Major League Baseball) or are reasonably sure that you would not want to leave.

For most people who attend college, the education will lead to higher incomes. But why is this so? Most of you will realize already that college teaches very few job skills in the

undergraduate years. Even people who study what they believe to be job-related subjects, such as Accounting, usually find that they have much to learn to be able to do a job. Other than Engineering, Computer Science, and Accounting, one does not have to have any particular major to obtain a particular job. In recent years, people admitted to medical school were more likely to be English majors than any other. And one can gain entry to graduate school in almost any subject with any undergraduate major. So what exactly does your undergraduate education do to enhance your later earnings. There are two competing ideas about the answer. One would be called *the human capital view*. Those supporting it argue that, while undergraduate education does not teach specific job skills, it does teach you how to think critically, how to analyze, how to obtain information needed, how to communicate well, and how to teach yourself what you need to know. (In your learning, you do most of the teaching of the material to yourself.) These skills are essential in being successful in any type of employment that will pay well. The other view is called *the screening or signaling view*. Those supporting it believe that one of the main requirements for perfect competition does not exist in real labor markets: companies do not have perfect information about job applicants. It is argued that companies actually know very little about job applicants and that it would be very difficult or very costly for them to find out what they need to know. Therefore, it is argued that companies practice what is called *“statistical discrimination”*. *People are placed into groups --- groups to which they belong and which the employer can identify easily. People are then treated as typical of the group they are in.* Consider two applicants for a job. If we knew everything we needed to know, we would know that they are identical. However, all we know is that both have Bachelors degrees --- one from Harvard and one from San Diego State University. Who gets the job? Most would answer that it would be the one from Harvard. Why? It is not that teaching is better at Harvard than at San Diego State. In fact, it is not. To some degree, the facilities are better at Harvard; however, this is not the reason that the Harvard graduate would be hired. In this view, Harvard is much harder to get into than San Diego State. **The school one graduates from serves as one screen. Another screening device would be grades.** Two Harvard graduates might be the same. But if one has a 4.0 GPA while the other has a 2.5 GPA, the first is more likely to be hired. **In this view, the function of higher education is to serve as a series of screens (or as signals) telling employers which people are the most able.** Some people are screened out at the beginning --- they do not get into a college. Others are screened in a later stage --- they don't graduate from college, or they graduate from a college considered less prestigious (i.e., easier to gain entrance), or they graduate with a lower GPA. Those that make it through all of the screens are able to obtain the best jobs. Those who make it through most screens obtain the next best jobs. And so on. In California, this phenomenon is built into the law: the University of California (8 campuses) takes in the top 1/8 of the high school graduating class, the California State Universities and Colleges (CSU) takes in the top 1/3 of the high school graduating class, and the community colleges take in everyone. There is probably considerable truth in both views.

Studies reveal another interesting phenomenon. After college is done, the gain in income does not happen immediately. For most people, the income earned after finishing college is less than could have been earned had one worked since the end of high school. This exists for a few years after graduating from college. Many recent college graduates are frustrated when they see this. The reason for it has to do in part with *formal training by companies*. The skills learned in this formal training are **general skills**. Since they can be easily transferred to other employers, companies require workers to “pay for” the acquisition of these skills. One “pays for” this

training by accepting a lower wage than one could have received. For people starting a career, the starting pay often provides a misleading view of the quality of a job. Jobs with excellent training opportunities commonly have lower starting pay than those with poor training opportunities. One is often better-off in the long-run by taking a job with lower starting pay but with better training opportunities.

## Experience

Now let us shift to the **acquisition of specific skills --- those that cannot be transferred between employers**. One learns these through **“experience”**. This sometimes involves simple trial-and-error. It sometimes involves watching more experienced workers do a task. And it sometimes involves asking questions of other workers. Early in your career with a company you may not be very productive. Yet, you are being paid by the company. *The amount you are paid is greater than your marginal revenue product. In effect, the company is “investing” in you as a worker. The company is “paying for” your acquisition of specific skills.* Of course, you are not paid to be unproductive; you are paid to learn. As you learn the specific job skills, you become more productive. *At a later stage of your career with the company, the company will pay you less than your marginal revenue product.* How can they get away with this? The answer is that, while you are being paid less than you are contributing to the revenue of this company, you are paid more than you could contribute to the revenue of other companies. Your skills are specific to employment in this company. If you moved to another company, you would largely have to start over in acquiring specific job skills. **The difference between the amount the company pays you and your marginal revenue product is the company’s return on its “investment” in you early in your career.**

The importance of specific skills in many jobs explains several phenomena. One is the common practice of *seniority rights*. If a company has to lay-off 5% of its workers, we know which ones will be laid-off? It will be the 5% of the workers who were the most recently hired. The senior people will also be paid more than the junior people, will have the longer vacations, and will be first to get perquisites, such as better parking spaces, better offices, and so forth. Imagine that there were no seniority rights. A new employee is hired. The person has good potential but, because the skills are specific to this company, does not have the experience yet. The new worker will try to gain the experience by watching the senior people or by asking them questions. If there were no seniority rights, the senior people would feel threatened. To protect themselves, they would not answer the questions (or would give false answers) and would not let the new workers watch. By granting seniority rights, the senior workers are not threatened by the new workers. They will answer all of the questions and allow the new workers to see their work. The company as a whole benefits because the new workers are able to learn the specific skills faster and become more productive. When one sees seniority rights in a company, one can guess that the development of specific job skills is important in that company.

Specific job skills also partially explain other phenomena. If specific skills are important to the productivity of workers in a company, the company will desire workers who can learn these skills quickly and who will stay with the company for a long time. Since companies are paying a new worker more than his or her marginal revenue product while the worker is learning, the companies want this period to be as short as possible. And since, after the worker has learned

the specific skills, the company will pay the worker less than his or her marginal revenue product, the company wants this period to be as long as possible. But, unlike the assumptions of perfect competition, information in labor markets is likely to be very poor. Companies are not able to know which workers will learn fastest and which workers will stay with the company for a long time. Nor can they learn anything about these by asking the worker. Therefore, the companies once again practice *statistical discrimination*. ***They treat the individual as typical of the group.*** **To determine who might learn fastest, they might group people according to education**, as discussed earlier. How much education have you had? Which university did you attend? What were your grades? Based on these questions, they can categorize people. Those with the most years of school, who went to the most prestigious universities, and who had the highest grades are the most likely to be hired. **In terms of staying on the job, people can be grouped according to gender.** Men have tended to stay on jobs longer than women --- largely because women have tended to leave jobs when they have their children. Married men tend to stay on jobs longer than single men. ***Where specific job skills are important, men are more likely to be hired because of the statistical discrimination.*** As a result of this, a large proportion of women who work do their work in jobs where most of the skills are general skills: teaching, nursing, retailing, and clerical jobs. One of the goals of *affirmative action* was to overcome this statistical discrimination. Companies were to develop goals for increasing the hiring of women and timetables by which the goals would be achieved. As companies hired more women, they would see that women do not leave jobs as often as had been thought. The statistics would change. Women would no longer be kept from jobs where specific job skills were important because of statistical discrimination.

We have explained the differences in people's wages as resulting from differences in the characteristics of the workers themselves. But sometimes wage differences result from certain characteristics of the jobs. **Workers who work in jobs that are very unpleasant tend to have higher wages.** So, higher wages are needed to induce people to become garbage collectors. **Workers who work in jobs that are very risky (such as those who build high rise buildings) also tend to have higher wages.** These are necessary in order to induce enough people to take the risks. On the other hand, **people may have non-pecuniary (non-monetary) benefits from a job.** For example, teachers have what would seem to be low wages considering the amount of education it takes to become a teacher. However, teachers have considerable periods of vacation, have job security, and have jobs that are usually considered pleasant to do. The vacations, the job security, and the pleasantness of the job have value to teachers, even though this value does not come in the form of money. Adding the value of these non-pecuniary benefits to the wages indicates that the true compensation of teachers is indeed in line with that of others who require the same amount of education.

In summary, our analysis has allowed us to focus on many possible reasons for the fact that women earn less than men and for the fact that the earnings gap between women and men has been narrowing. Our analysis tells us to consider the prices of the products produced by the workers. We would hypothesize that these prices are higher for products produced by men but that the difference has been narrowing recently. Our analysis tells us to consider people's "natural abilities". For example, it has been argued that women may have earned less than men because they are socialized to be less aggressive; that type of socialization may be less common now. It has also been argued that women tend to earn less than men because they are typically

shorter.

Our analysis tells us to consider the amount of capital per worker that workers work with, as well as the technology of that capital. Men may have earned more than women because they had access to more and better capital. With the growing use of computers, that advantage may be narrowing.

Our analysis tells us to consider the different motivation of men and women. Many people once argued that most women saw their main role as full-time mothers and were less motivated to pursue career advancement than men. Today, this may no longer be true.

Our analysis also tells us to consider skill development. Women may earn less than men because they had less education or different types of education. (For example, even today, women are much less likely than men to be engineers.) Women may have had less access to company training programs. And women may have not had access to jobs that provided considerable specific training because of the company's belief that they would leave employment (statistical discrimination). All of this may be changing today.

Finally, our analysis tells us to consider the differences in the types of jobs done by men and women. Jobs typically held by women may be more pleasant and less risky than some jobs typically held by men.

In examining all of these points, we can learn much about why men have earned more than women and why the earnings gap has been narrowing. But we cannot learn all we need to know. There are surely other aspects to the explanation. One of these, discrimination, is not considered here.

### **Internet Assignment**

There is a wage gap between women and men. There is also a wage gap between ethnic groups.

1. First, provide evidence as to the extent of the wage gap between women and men.
2. Second, provide evidence as to the trend of the wage gap between women and men over the last twenty years.
3. Third, show with data how California compares to other states in the wage gap between women and men.
4. Fourth, provide evidence as to the extent of the wage gap between whites and minority groups.

You can find the answers to questions 1 to 3 at the following sites:

[http://135.145.13.100/women/exec99\\_table.htm](http://135.145.13.100/women/exec99_table.htm) or

<http://www.whitehouse.gov/WH/New?html?eqpay2.html>

You can find the answer to question 4 at the following sites:

<http://www.bib.net/eg110298.htm> or <http://www.access.gpo.gov/eop/ca/pdfs/ch4.pdf> (This latter site requires an Adobe Reader)

### **Practice Quiz for Classes 15 and 16**

1. Which of the following concepts represents the extra revenue a firm receives from the services of an additional worker?
  - a. marginal revenue
  - b. marginal resource cost
  - c. total revenue
  - d. marginal revenue product

2. Workers	Quantity Produced
1	20
2	39
3	57
4	74
5	90
6	105

This company is a profit-maximizing firm selling in a competitive product market and hiring in a competitive labor market. It uses semi-skilled labor to produce dampers used in office building ventilation systems. Assume that the current market price per damper is \$100 and that the prevailing monthly salary per semi-skilled worker is \$1,700. This company should employ \_\_\_\_\_ workers.

- a. 2   b. 3   c. 4   d. 5   e. 6
3. The **demand for labor** is the same as the  
 a. marginal revenue product curve   c. supply of labor  
 b. marginal physical product curve   d. demand for the product
4. The demand for labor **slopes down and to the right** (meaning that companies hire more workers as the wage falls) because of  
 a. the law of diminishing marginal returns   c. the invisible hand  
 b. the law of demand   d. price discrimination
5. The demand for labor will be **more inelastic** if:  
 a. there are many substitutes for labor  
 b. there is a long time under consideration  
 c. labor is a small percent of the total cost of production  
 d. the demand for the product is relatively elastic  
 e. all of the above
6. Skills that **cannot** be transferred to other employers are called:  
 a. general skills   c. non-pecuniary skills  
 b. specific skills   d. portable skills
7. Which skills are most likely to be paid for by the **employer**?  
 a. General skills   b. Specific skills   c. Human Capital
8. If worker A earns more in wages than worker B, it could be because:  
 a. The product made by worker A sells for a higher price than that made by worker B  
 b. Worker A uses more capital per worker than worker B  
 c. Worker A has more general and specific skills than worker B  
 d. All of the above
9. **Skills that embodied in a person** are called  
 a. Embodied skills   b. Human Capital   c. Statistical skills   d. Personal skills
10. **“Treating an individual as typical of a group”** is the definition of  
 a. pure discrimination   b. statistical discrimination   c. human capital   d. general skills

**Answers: 1. D   2. C   3. A   4. A   5. C   6. B   7. B   8. D   9. B   10. B**