Chapter 7 Problems

C Level Questions

1. The following question deals with the idea of a Natural Rate of Unemployment.

a. Data on a recent survey of WWU students is as follows: students can be classified as "dating" and "single." For each student, 10 percent of those that are single become dating and among those that are dating, 5 percent become single. If there are 1000 WWU students, what is the steady state number of students who are dating?

b. Imagine that in order to stimulate campus harmony, the psychology department decided to subsidize tuition payments of students that were dating. How would this effect your answer to part a?

B Level Questions

2. Many jobs involve advancement after observation of employees. For instance, professors are either "pre-tenure" or tenured professors. This problem is intended to ask about the role of shirking and working hard in markets for laborers that advance by stages.

a. Consider the market for professors that is described by the equations:

$$Y = 800L^{\frac{1}{2}} \qquad L^s = \left(\frac{W}{P}\right)^2$$

where Y represents the production of professors (perhaps measured in added IQ points of their students). L^s represents the labor supply of professors.

Solve for the labor demand of professors and then solve for the equilibrium real wage and numbers of professors hired.

b. One way to view the career of professors is to consider their employment consisting of two periods: before tenure and after tenure. To make this problem as easy as possible, imagine that in both periods professors earn a real wage of $\frac{W}{P}$. Further, imagine that professors make a one time decision upon being hired in the first period of working hard or shirking. Regardless of their decision, each professor takes home $\frac{W}{P}$ at the end of their first period. Professors who work hard will survive into the second period with probability $p = \frac{3}{4}$. Professors who shirk will survive into the second period with $p = \frac{2}{3}$. Professors who work hard receive payment of $\frac{W}{P}$ from their universities but also incur a cost of working hard that is valued at one unit of real wage. Assume that by working hard, the cost is incurred both in period 1 and period 2. Those who choose not to work hard incur no cost in either period. Finally, assume all professors, regardless of their work-level, choose to retire at the end of the second period.

How much should this firm pay in order to insure that all professors hired will work hard?

c. If universities choose to pay their professors just enough to get them to work hard, what would the resulting unemployment rate equal?

3.   Imagine that the heavy construction labor industry can be described by the following equations:

$$\text{Labor Supply: } \frac{W}{P} = 5 + 2L$$

$$\text{Labor Demand: } \frac{W}{P} = 20 - L$$

Where L measures thousands of workers and W/P is the real wage.

a. What is the equilibrium real wage in this market? How much labor is hired? What is the unemployment rate in equilibrium?

b. As the construction industry is highly variable, workers in this industry have a 5% chance each month of being laid off. What is the expected value of this job to the worker?

c. Imagine that when going to work, workers make a decision to work hard or to slack-off while working. If workers work hard they incur an extra burden in the form of sore muscles that costs the worker an equivalent of 6 units of real wage. Workers that slack incur no such additional costs but will be fired with 15% more frequency than workers that work hard (they lose their jobs with 20% probability as opposed to 5%). If firms want all of their workers to work hard, what wage will firms pay their workers? What is the unemployment rate?

d. Does your answer to part c change if the cost of working hard is 12 instead of 6? If so, what is the new unemployment rate?

4.   Imagine a firm that produces t-shirts with a production function of:

$$Y = 30L^{\frac{1}{2}}$$

where L is measured in thousands of people.
a. On the plot below, draw this firm's demand for labor. What is the equation for this firm's demand for labor?

$\dfrac{W}{P}$

Labor

b. The labor supply in this market is given by $\dfrac{W}{P} = 5L$. What is the equilibrium level of labor hired? What is the equilibrium real wage? How many t-shirts does this firm produce?

c. A large number of t-shirt employees have unionized and demand a real wage of 12. If the labor demand curve remains the same and the t-shirt companies agree to this wage, how many workers will get hired? How many t-shirts will this firm produce?

d. What is the unemployment rate when the unions negotiate a real wage of 12?

e. Discuss the impact the union's higher wages have on workers. Address the impacts on total payments to workers as well as impact on individual groups of workers.