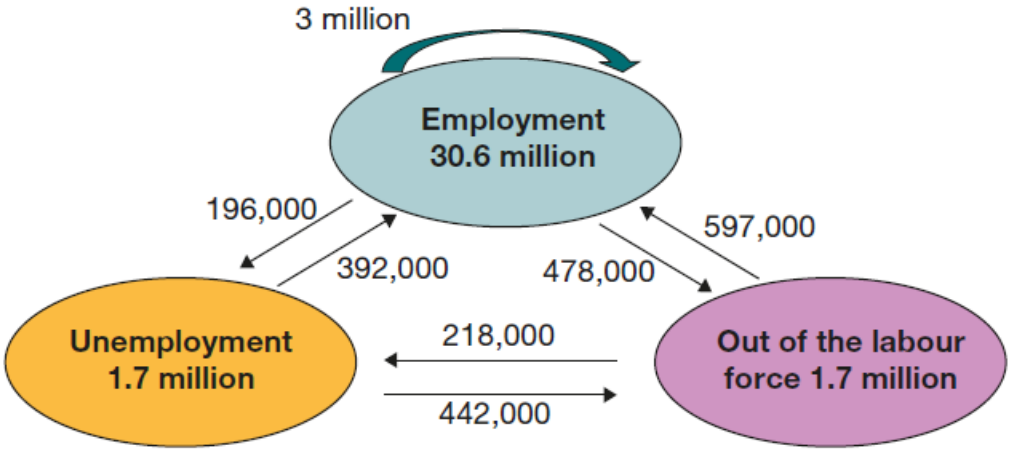
1. Using the graph below, answer the following questions:



   a. As a percentage of employed workers, what is the size of the flows into and out of employment (i.e. hires and separations) each month?
   b. As a percentage of unemployed workers, what is the size of the flows from unemployment into employment each month?
   c. As a percentage of the unemployed, what is the size of total flows out of unemployment each month? What is the average duration of unemployment?
   d. As a percentage of the labour force, what is the size of the total flows and net flows into and out of the labour force each month?

2. Suppose that the mark-up of goods prices over marginal cost is 10%, and the unemployment benefits level is 10%. That the wage-setting equation is:

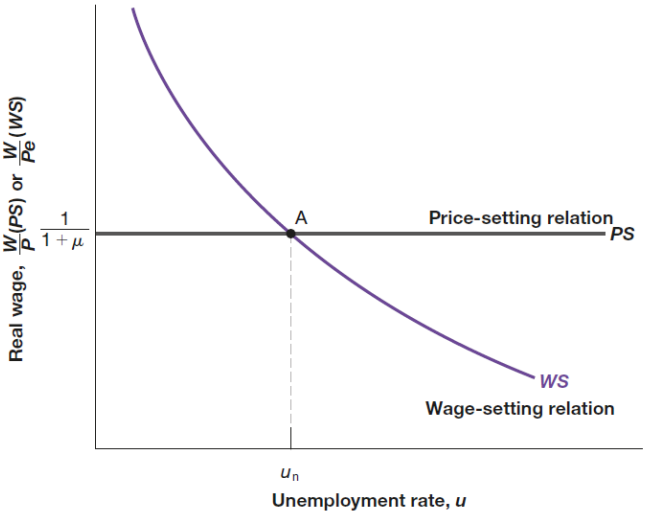
$$(1 + \mu)W = P,$$
$$F(z,u)=1-2u+z$$

   Where u is the unemployment rate.
   a. What is the real wage, as determined by the price-setting equation?
   b. What is the natural rate of unemployment?
   c. Suppose that the unemployment benefits/minimum wage decrease to 5%. What happens to the natural rate of unemployment? What would be the solution if mark-ups will fall to 5%? Explain the logic behind your answer. Draw a proper graph for each case.

3. In the mid-1980s, a famous supermodel once said that she would not get out of bed for less than $10,000 (presumably per day).
   a. What is your own reservation wage?
   b. Did your first job pay more than your reservation wage at the time?
   c. Relative to your reservation wage at the time you accept each job, which job pays more: your first one or the one you expect to have in 10 years?
   d. Explain your answers to parts (a) to (c) in terms of the efficiency wage theory.
   e. Part of the policy response to the crisis was to extend the length of time workers could receive unemployment benefits. How would this affect reservation wages if this change was made permanent?

4. Even in the absence of collective bargaining, workers have some bargaining power that allows them to receive wages higher than their reservation wage. Each worker's bargaining power depends on the nature of the job and the economy-wide labour market conditions. Let's consider each factor in turn.
    a. Compare the job of a delivery person and a computer network administrator. In which of these jobs does a worker have more bargaining power? Why?
    b. For any given job, how do labour market conditions affect a worker's bargaining power? Which labour market variable would you look at to assess labour market conditions?
    c. Suppose that for a given labour market conditions (the variable you identified in part (b)), worker bargaining power throughout the economy increases. What effect would this have on the real wage in the medium run? And in the short run? What determines the real wage in the model described in this chapter?

5. Consider the Figure below.



    a. Suppose the unemployment rate is very low. How does the low unemployment rate change the relative bargaining power of workers and firms? What do your answers imply about what happens to the wage as the unemployment rate gets very low?
    b. Given your answer to part (a), why is there unemployment in the economy? (What would happen to real wages if the unemployment rate were equal to zero?)

6. According to the data, about 44% of unemployed workers leave unemployment each month.
    a. Assume that the probability of leaving unemployment is the same for all unemployed, independent of how they have been unemployed. What is the probability that an unemployed worker will still be unemployed after one month? Two months? Six months?

    Now consider the composition of the unemployment pool. We will use a simple experiment to determine the proportion of the unemployed who have been unemployed for six months or more. Suppose the number of unemployed workers

is constant and equal to x. Each month, 47% of the unemployed find jobs, and an equivalent number of previously employed workers become unemployed.

b. Consider the group of x workers who are unemployed this month. After a month, what percentage of this group will still be unemployed? (Hint: If 47% of unemployed workers find jobs every month, what percentage of the original x unemployed workers did not find jobs in the first month?)
c. After a second month, what percentage of the original x unemployed workers has been unemployed for at least two months? (Hint: Given your answer to part (b), what percentage of those unemployed for at least one month do not find jobs in the second month?) After the sixth month, what percentage of the original x unemployed workers has been unemployed for at least six months?
d. The table below shows the proportion of unemployed who have been unemployed for six months or more (27 weeks or more) for each year between 2000 and 2014 for the US in 2015:

Year	Long-run unemployed	Year	Long-run unemployed	Year	Long-run unemployed	Year	Long-run unemployed
2000	11%	2004	22%	2008	20%	2012	41%
2001	12%	2005	20%	2009	32%	2013	38%
2002	18%	2006	18%	2010	43%	2014	33%
2003	22%	2007	18%	2011	44%		

How do the numbers between 2000 and 2008 (the pre-crisis years) compare with the answer you obtained in part (c)? Can you guess what may account for the difference between the actual numbers and your answer to this problem? (Hint: Suppose that the probability of exiting unemployment decreases the longer you are unemployed.)

e. What happens to the percentage of unemployed who have been unemployed for six months or more during the crisis years 2009 to 2011?
f. Is there any evidence of the crisis ending when you look at the percentage of the unemployed who have been unemployed for six months or more?
g. Part of the policy response to the crisis was an extension of the length of time an unemployed worker could receive unemployment benefits. How do you predict this change would affect the proportion of those unemployed for more than six months? Did this occur?

ADDITIONAL QUESTIONS:

Label each of the following statements is true, false or uncertain. Explain briefly.

1. Since 1950, the participation rate in Europe has remained around 70%.
2. Each month, the flows into and out of employment are very small compared with the size of the labour force.
3. Fewer than 10% of all unemployed workers exit the unemployment pool each year.
4. The unemployment rate tends to be high in recessions and low in expansions.

5. Most workers are typically paid their reservation wage.
6. Workers who do not belong to unions have no bargaining power.
7. It may be in the best interest of employers to pay wages higher than their workers' reservation wage.
8. The natural rate of unemployment is unaffected by policy changes.