OMG MIDTERM 1 IS ON MONDAY

- **Materials.** Have UCD Scantron 2000(s) and pencil(s). No calculators. 60 minutes.

- **Homework.** Make sure you understand it.

- **Practice Problems.** There are problems that aren't found in the homework, so you will be tested on *comprehensive understanding* instead of just regurgitating homework problems. Therefore I *highly* recommend doing the practice problems at the end of each chapter as well.

- **Book and Lecture Notes.** You will still have to think in novel ways that aren't exactly reflected in either the homework or the practice problems. And you will need to be able to explain things that weren't directly asked in homework or practice problems.

- **Formulas.** Memorize them. Be able to use them.

- **Graphs.** Be able to read them.

- **Data.** Be familiar with them.

- **Know Everything.** Discussions are short and only once a week, so what I've covered is *not* an exhaustive list of things you'll need to know. In fact, I can promise you that there are things on the midterm that I haven't had time to mention at all.

Problem 1. Consider the following 2012 FRED Data:

Civilian Noninstitutional Population (Thousand persons)	237,829
Civilian Labor Force (Thousand persons)	153,885
Civilian Employment (Thousand persons)	139,077
Discouraged Workers – Men (Thousand persons)	731
Discouraged Workers – Women (Thousand persons)	709
Natural Rate of Unemployment (%)	5.20%

Find the labor force participation rate as a percentage.

Hint: the civilian noninstitutional population refers to people 16 years of age and older who are not inmates of institutions (penal, mental facilities, homes for the aged), and who are not on active duty in the Armed Forces. In other words, these are people who are able to perform civilian work, i.e. the civilian population.

Answer 1.

- The **civilian population** are those who are *able* to perform civilian work.

- The **labor force** are those in the civilian population who are *willing* to work.

- The **labor force participation rate** is the ratio of how many people are *willing* to work to how many people are *able* to work. In other words,

$$\text{labor force participation rate} = \frac{\text{labor force}}{\text{civilian population}} \times 100.$$

So the answer to this one is

$$\frac{153,885}{237,829} \times 100 \approx 64.70\%.$$

Problem 2.   Consider the following 2012 FRED Data:

Civilian Noninstitutional Population (Thousand persons)	237,829
Civilian Labor Force (Thousand persons)	153,885
Civilian Employment (Thousand persons)	139,077
Discouraged Workers – Men (Thousand persons)	731
Discouraged Workers – Women (Thousand persons)	709
Natural Rate of Unemployment (%)	5.20%

Find the overall unemployment rate in 2010 as a percentage.

Answer 2. We define **unemployment** to occur when some people who want (i.e. are willing and able) to work do not have a job. The **unemployment rate** is given by

$$\text{unemployment rate} = \frac{\text{unemployed people}}{\text{labor force}} \times 100.$$

Note that the labor force can be written as

$$\text{labor force} = \text{employed} + \text{unemployed}.$$

The labor force is 153885. Of that, 139077 have jobs. This means that the remaining $153885 - 139077 = 14808$ are unemployed. Therefore the unemployment rate is

$$\frac{14808}{153885} \times 100 \approx 9.62\%.$$

Problem 3. Consider the following 2012 FRED Data:

Civilian Noninstitutional Population (Thousand persons)	237,829
Civilian Labor Force (Thousand persons)	153,885
Civilian Employment (Thousand persons)	139,077
Discouraged Workers – Men (Thousand persons)	731
Discouraged Workers – Women (Thousand persons)	709
Natural Rate of Unemployment (%)	5.20%

Find the cyclical rate of unemployment in 2012.

Answer 3.   There are two types of unemployment: **natural unemployment** and **cyclical unemployment**. The sum of the two is total unemployment:

$$u = u_n + u_c.$$

It tells us that the natural rate of unemployment is 5.20%. Therefore any unemployment beyond that must be cyclical employment. From the previous problem, total unemployment is 9.62%. Therefore

$$\text{cyclical unemployment} = \text{total unemployment} - \text{natural unemployment}$$

$$= 9.62\% - 5.20\% = 4.42\%.$$

Problem 4.   Consider the following 2012 FRED Data:

Civilian Noninstitutional Population (Thousand persons)	237,829
Civilian Labor Force (Thousand persons)	153,885
Civilian Employment (Thousand persons)	139,077
Discouraged Workers – Men (Thousand persons)	731
Discouraged Workers – Women (Thousand persons)	709
Natural Rate of Unemployment (%)	5.20%

The overall unemployment rate that you calculated above excluded discouraged workers. If you included the discouraged workers in your calculation, the "true" overall unemployment rate would equal what?

Answer 4. Discouraged workers workers are those who have left the labor force and the unemployment pool because they don't think they can find any job in the existing labor market conditions. There are $731 + 709 = 1440$ of them in this example.

By ignoring them, we are in some sense underestimating the unemployment rate. We can reincorporate them into a different (unofficial) measure of unemployment by adding their number to the unemployed and to the labor force:

$$
\begin{aligned}
\text{``true'' overall unemployment rate} &= \frac{\text{unemployed} + \text{discouraged workers}}{\text{labor force} + \text{discouraged workers}} \times 100 \\
&= \frac{14808 + 1440}{153885 + 1440} \times 100 \\
&\approx 10.46\%.
\end{aligned}
$$

Problem 5. We have the following information about a small country:

$$\text{Civilian Population} = 300,000$$

$$\text{Unemployment Rate} = 15.00\%$$

$$\text{Labor Force Participation Rate} = 60\%.$$

Calculate the following:

(a) The size of the labor force

(b) the number of unemployed people

(c) The number of employed people

(d) The employment-population ratio.

Answer 5.

(a) We're told that 60% of the 300000 civilian population are participating in the labor force, so the size of the labor force is

$$LFPR \times \text{civilian population} = (0.60)(300000) = 180000.$$

(b) Of those 180000 people in the labor force, we are told that 15% of them are unemployed. So the number of unemployed people is

$$\text{unemployment rate} \times \text{labor force} = (0.15)(180000) = 27000.$$

(c) Because employed and unemployed sums to the labor force, it follows that the number of employed is

$$\text{labor force} - \text{unemployed people} = 180000 - 27000 = 153000.$$

(d) The **employment-population ratio** is

$$\frac{\text{employed people}}{\text{civilian population}} = \frac{153000}{300000} = 51\%.$$

Problem 6.   In the previous question the government officials of the country conveniently forgot to include the discouraged workers in their calculations. After some research you find out that there were a total of 11,250 discouraged workers in the country. Therefore, you conclude that the "true" unemployment rate was what percent?

Answer 6. Again, add the discouraged workers to unemployed people and to the labor force and we have

$$\text{"true" unemployment rate} = \frac{27000 + 11250}{180000 + 11250} \times 100 = 20\%.$$

Problem 7.   Indicate which of the following result in an increase in natural unemployment.

(a) Due to globalization, some Sacramento factories relocate to Indonesia.

(b) Automation results in many workers in auto industry losing their jobs.

(c) Many new college graduates enter the job market.

(d) American households begin to worry about their jobs and reduce their spending on goods and services. This causes a severe recession.

Note: **natural unemployment** is not related to the level of real GDP. It is only natural to have this kind of unemployment in a growing free market capitalist system. We can have natural unemployment even if real GDP equals or exceeds potential. Reasons for natural unemployment include:

- **frictional unemployment.** It takes a few weeks to a few months to find a job.

- **structural unemployment.** The structure of industries change. Some jobs might be outsourced. Think *skills mismatch.*

- **excessive real wages.** "In this book we will by and large ignore the minimum-wage and efficiency-wage explanations of natural unemployment." Make of that what you will.

You can write $u_n = u_f + u_s$ if you'd like.

Answer 7. I recommend a two-part approach to answering this. First, is the increase in unemployment cyclical in nature, i.e. does it have anything to do with recessions? If so, then the answer is no—cross it off.

Then ask if the remaining ones will increase or decrease employment.

(a) *Yes.* Jobs leaving the country is a structural change, and the people who had jobs in Sacramento factories are now unemployed.

(b) *Yep.* This is another structural change. The workers whose jobs have been taken over by robots are now unemployed.

(c) *Yahuh.* They've entered the labor force, but it's going to take them time to actually find jobs, so there is an increase in frictional unemployment.

(d) *Nope.* This unemployment is related to a recession and is therefore cyclical instead of natural.

Note that a *decrease* in real GDP is associated with an *increase* in cyclical unemployment (e.g. recessions), and vice versa. If cyclical unemployment is positive, then the economy is producing below potential GDP; if cyclical unemployment is negative, then the economy is producing above potential real GDP.

Also note that natural unemployment occurs even when the labor market is in equilibrium; when we're looking at a non-equilibrium real wage, then the result is cyclical unemployment.

Problem 8.
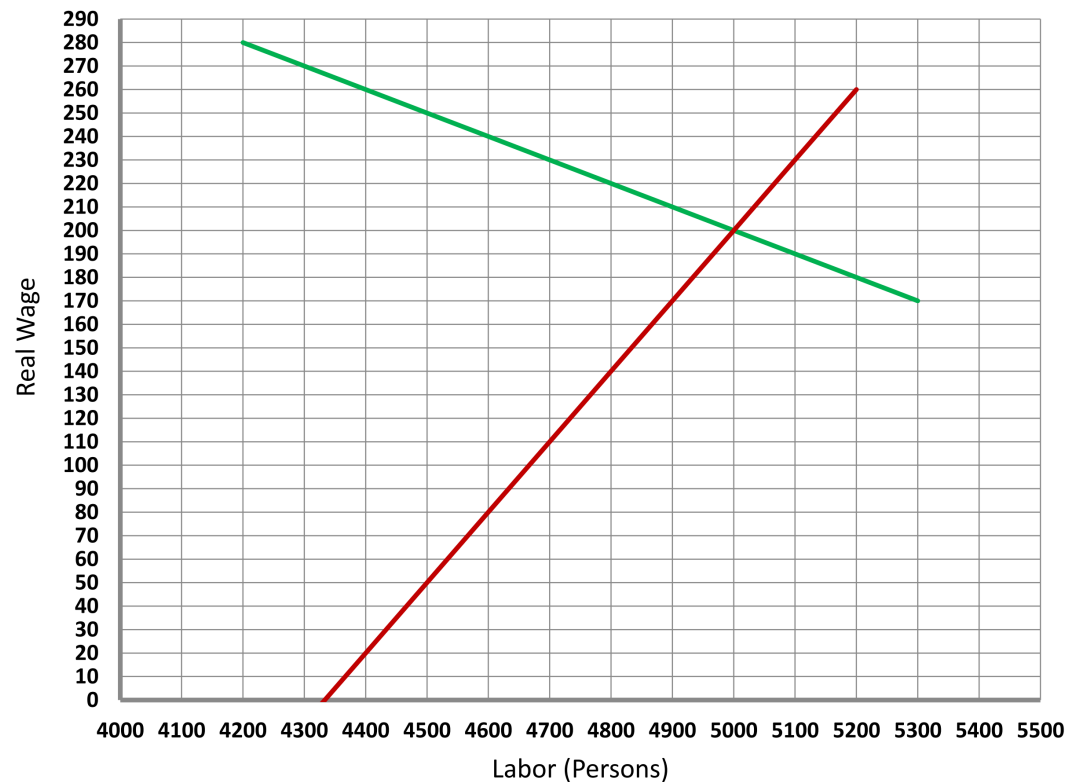
In the long run, wages and prices are fully flexible. In the short run, they are sticky or rigid. The natural rate of unemployment is 6 percent.

(a) Find the initial overall unemployment rate.

(b) Now suppose that the stock market crashes and many households experience reductions in the values of their financial wealth. As a result, they reduce their demands for goods and services. Because of this, demand for labor decreases by 400 workers. If the real wage gets stuck at the current level, the overall unemployment rate will be what?
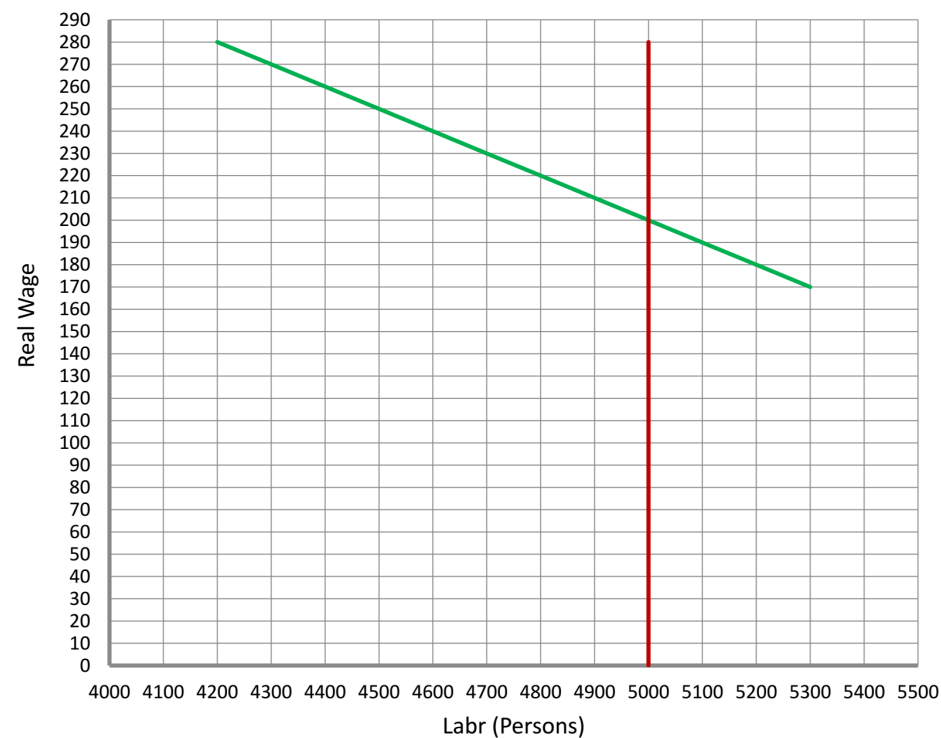
Answer 8.
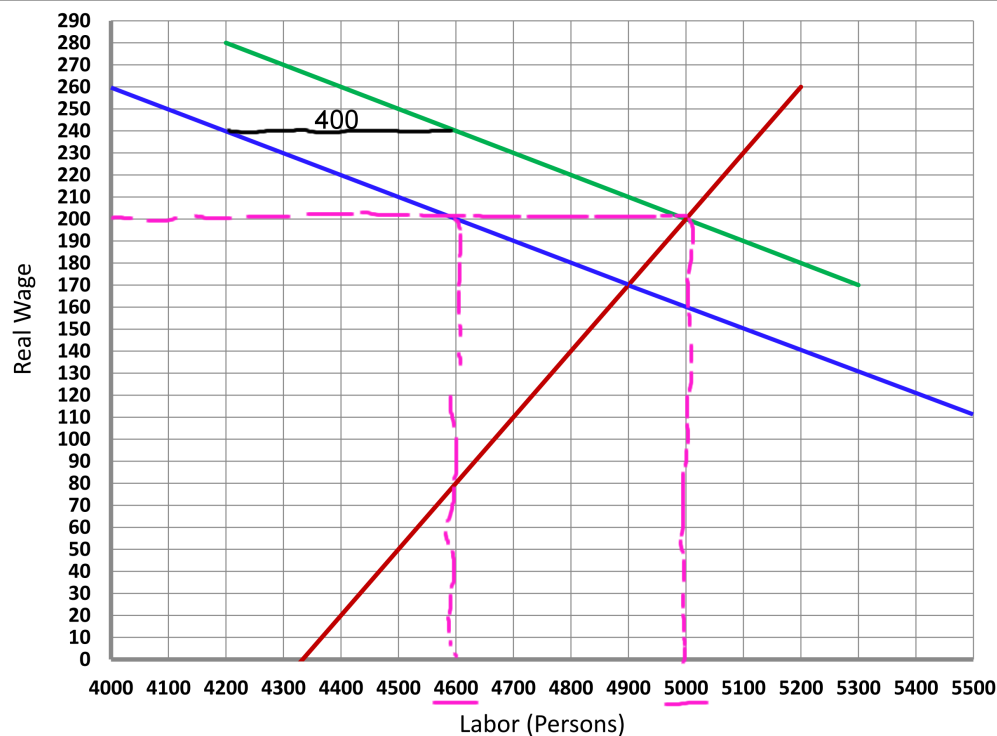
(a) The natural rate of unemployment is 6%. This means that even when the labor market is in equilibrium, there is 6% total unemployment.

(b) Demands shifts to the left by 400. At the real wage of 200, this means that firms want to hire 4600 people whereas 5000 people want to work. Thus, 400 of 5000 people can't find work *due to the recession*. This means that the cyclical rate of unemployment is
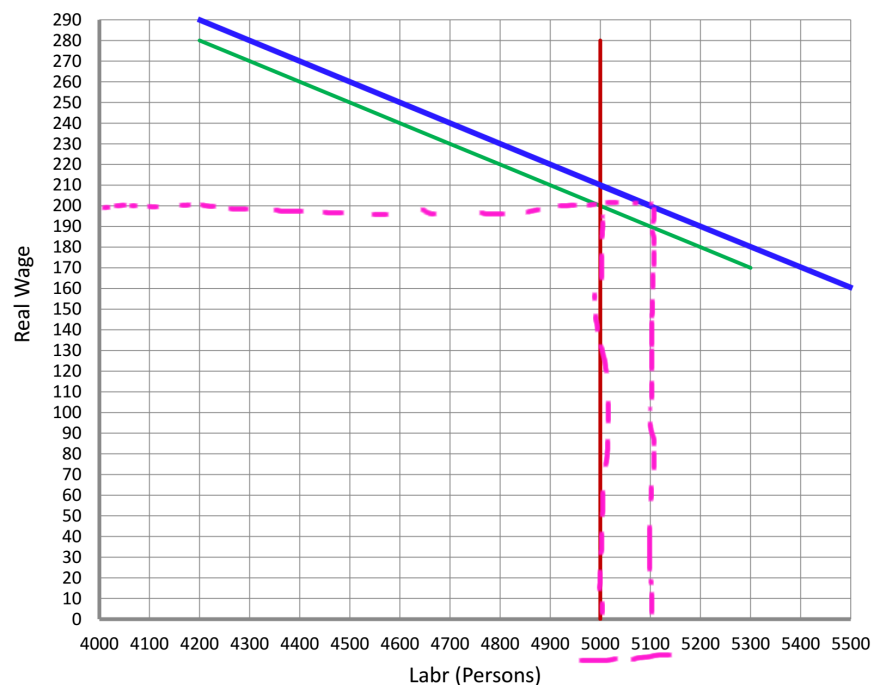
$$u_c = \frac{\text{jobs wanted} - \text{jobs available}}{\text{jobs wanted}} = \frac{5000 - 4600}{5000} = \frac{400}{5000} = 8\%.$$

Therefore the total unemployment rate is $u = u_n + u_c = 6\% + 8\% = 14\%$.

Problem 9. The following graph shows the short-run labor market conditions in a country. The supply of labor is vertical. In other words, the amount of labor supplied is not sensitive to changes in the real wage. This can happen, as you know, if the substitution effect of a change in the real wage equals the income effect, so that neither effect is dominant. The natural rate of unemployment is 5 percent.

If demand for labor increases by 100 workers and the real wage stays at the current level, the overall unemployment rate will equal what percent?

Answer 9.

Shift demand to the right by 100. Now follow the same process as in the previous question, even though might seem kind of weird.
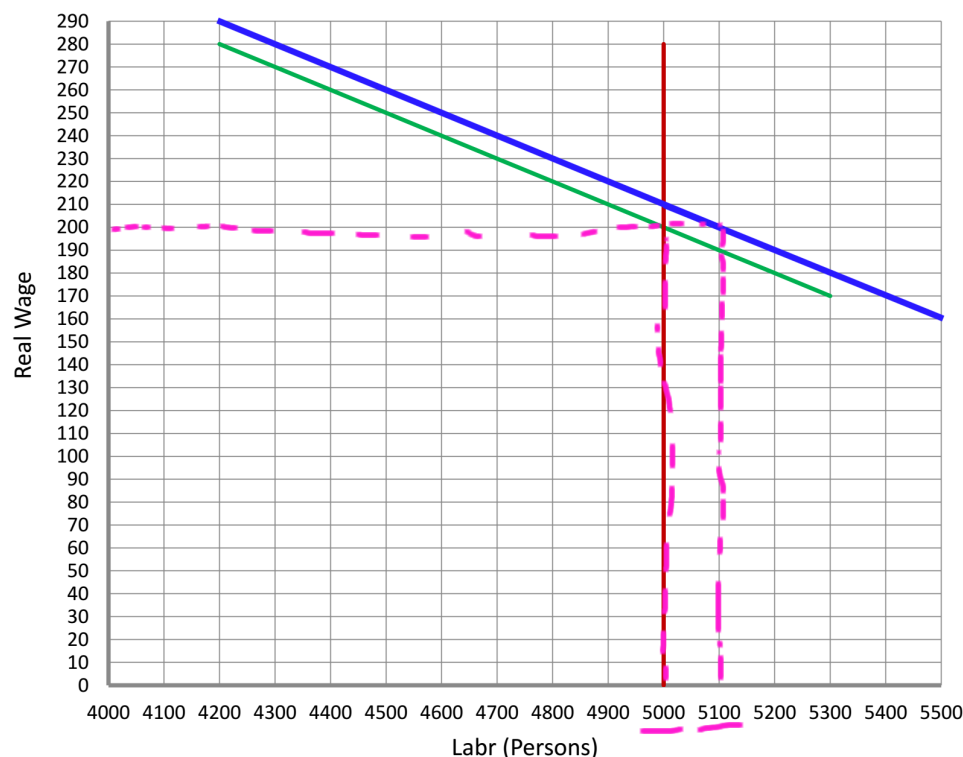
At the real wage of 200, this means that firms want to hire 5100 people whereas 5000 people want to work.

$$u_c = \frac{\text{jobs wanted} - \text{jobs available}}{\text{jobs wanted}} = \frac{5000 - 5100}{5000} = \frac{-100}{5000} = -2\%.$$

Therefore the total unemployment rate is

$$u = u_n + u_c = 5\% - 2\% = 3\%.$$

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Negative? Huh?

5000 people want jobs at the real wage of 200. The natural rate of unemployment is 5%, which means 250 people are naturally unemployed—and 4750 people are naturally employed. So potential GDP occurs when there are 4750 people working.

The cyclical rate of unemployment is -2%, which means there are $(-0.02) \times 5000 = -100$ cyclically unemployed people—in other words, 100 cyclically *employed* people. Therefore there are a total of $250 - 100 = 150$ unemployed people, which means 4850 workers. This is above full employment of 4750, and therefore actual GDP is above potential GDP.

Problem 10.   Consider the labor-market graph in Question 9. In the class we assumed that when demand for labor is reduced in the short run, the real wage stays the same. This was just to simplify our analysis. In the real world the real wage is slightly pro-cyclical. What this means is that the real wage moves somewhat with the real GDP. In a recession, it goes down. In an expansion, it goes up.

Suppose that demand for labor decreases by 600 workers due to a recession. If the real wage stays at the current level, then

(a) How many people will be naturally unemployed?

(b) How many people will be cyclically unemployed?

(c) What is the overall unemployment rate will be?

Suppose again that demand for labor decreases by 600 workers due to a recession, but this time the real wage decreases to 170 units.

 (i) How many people will be naturally unemployed?

 (ii) How many people will be cyclically unemployed?

(iii) What is the overall unemployment rate will be?

Answer 10.

(a) At full employment, 5000 workers want to work and 5000 firms want to hire a worker. But the natural unemployment rate is 5%, so $0.05 \times 5000 = 250$ cannot actually land a job. This is the number of people that are naturally unemployed, regardless of how unemployment changes due to the recession.

(b) After the demand curve shifts, firms want to hire 4400, whereas 5000 workers want to work. This means that 600 people are cyclically unemployed.

(c) Therefore total unemployment is 850. The labor force is 5000, so the total unemployment rate is $850/5000 = 17\%$.
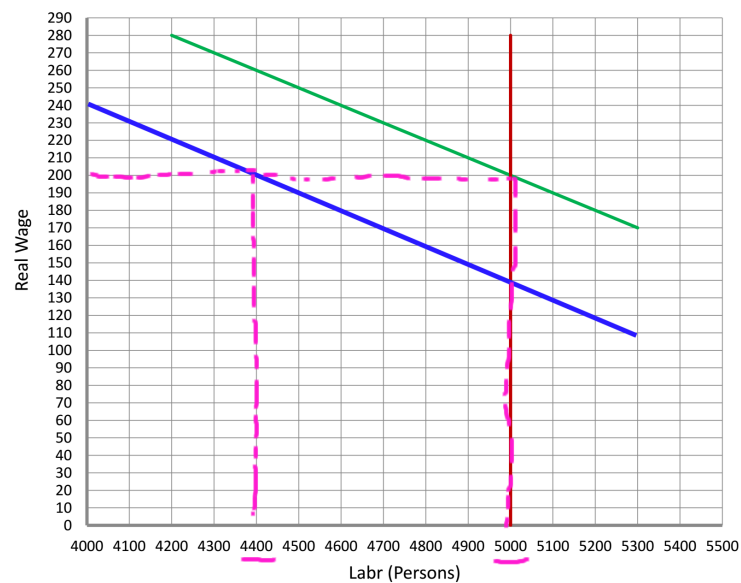
(i) Same as before—250 people are naturally unemployed.

(ii) Firms want to hire 4700, whereas 5000 workers want to work. This means 300 people are cyclically unemployed.

(iii) Therefore total unemployment is 550. The labor force is 5000, so the total unemployment rate is $550/5000 = 11\%$.
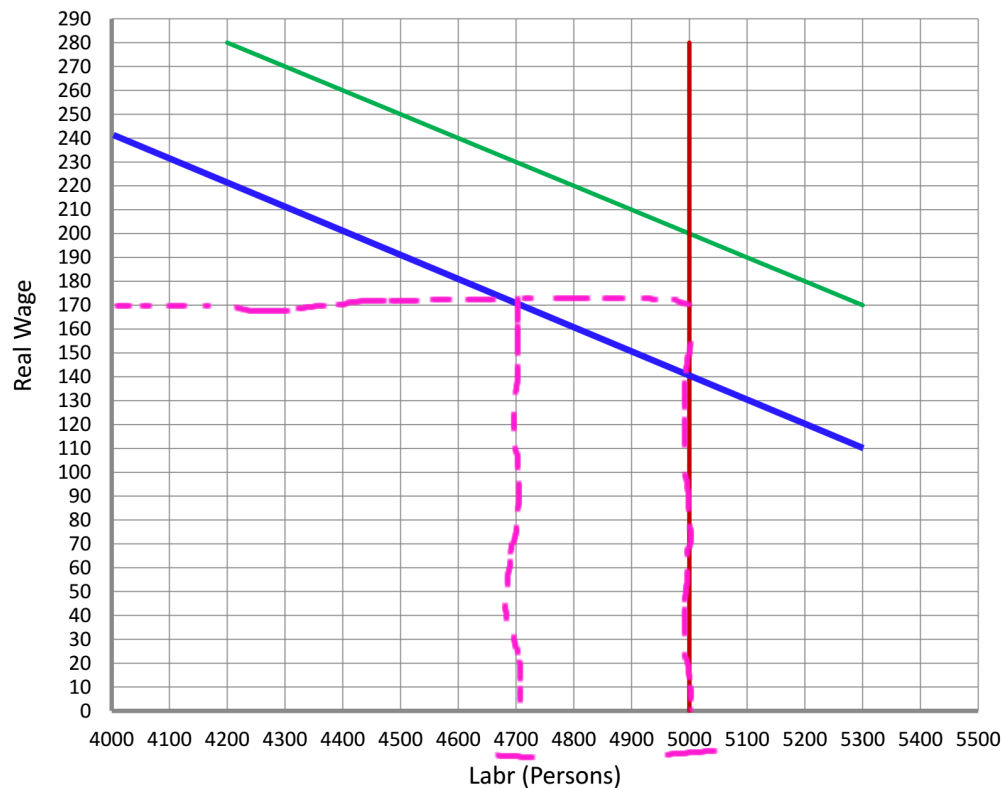
Practice Problems

Problem 11.   In a country, the overall rate of unemployment is 11% and the natural rate of unemployment is 5%. Assume that the Okun's coefficient is $\alpha = 2$. Find the percentage GDP gap in this country.

Recall that **Okun's Law** says

$$\frac{Y_p - Y}{Y_p} = \alpha \times u_c,$$

where Y_p is potential GDP, Y is actual GDP, u_c is cyclical unemployment, and α is **Okun's coefficient**. The **GDP gap** is the difference between actual and potential GDP, and the percentage GDP gap is the LHS

$$\frac{Y_p - Y}{Y_p}.$$

Answer 11.   The cyclical rate of unemployment is $u_c = 11 - 5 = 6\%$. Therefore the answer is

$$\alpha \times u_c = 2 \times 6\% = 12\%.$$

Problem 12.   Match these things,

(a) Observation the each additional worker increases output by a smaller amount than did the previous worker.

(b) The component of a change in the quantity of labor supplied as a result of a change in the real wage that is due to the change in the opportunity cost of leisure.

(c) The nominal benefit from hiring another unit of labor.

(d) The total number of all the filled and vacant jobs available in an economy is the same as:

(e) The component of a chance in the quantity of labor supplied as a result of a change in the real wage that is due to the change in the workers' incomes.

with these things,

(i) marginal product of labor

(ii) value of marginal product

(iii) demand for labor

(iv) supply of labor

(v) income effect

(vi) substitution effect

(vii) law of diminishing returns

Answer 12.

- (a) goes with (vii). This explains why the production function is concave. It also explains why the demand for labor function is downward sloping—each worker is less productive, so the firm would want to reduce the wage.

- (b) goes with (vi). If you are offered a higher wage, then leisure becomes relatively less attractive, so you will be inclined to substitute leisure time for working time. This is why supply of labor is upward sloping.

- (c) goes with (ii). This is $MPL \times W$, the benefit a firm receives from hiring the additional (i.e. marginal) worker.

- (d) goes with (iii). It is the amount of jobs the firm wants to fill—which may or may not actually become filled—for various real wages.

- (e) goes with (v). If you are offered a higher wage, then you don't have to work as much in order to pay all of your bills and stuff. In this case, the higher wage might incite you to actually work less. This works in the opposite direction of the substitution effect. We usually assume that the substitution effect dominates the income effect.