Problem 1. Define a **discouraged worker** and a **marginally attached** worker.

Answer 1. A marginally attached worker doesn't have a job and isn't looking for a job, but they'd still like one. They might have to stay home to deal with family issues or they might be sick. Also, they might have just given up: if they have not searched for work in the last four weeks because they think that there are no jobs available for them, then they are a discouraged worker. Therefore discouraged workers are a specific type of marginally attached worker.

Problem 2. For a country with the following data,

$$\begin{aligned} \text{Civilian Population}: &\quad 125,000, \\ \text{Employed}: &\quad 95,000, \\ \text{Unemployed}: &\quad 5,000, \\ \text{Discouraged}: &\quad 18,750, \\ \text{Marginally Attached}: &\quad 20,000, \\ \text{Part-Time}: &\quad 3,000, \end{aligned}$$

find the official unemployment rate.

Answer 2. The labor force is $95,000 + 5,000 = 100,000$. Therefore the unemployment rate is

$$u = \frac{5,000}{100,000} = 5\%.$$

Problem 3. For a country with the following data,

$$\begin{aligned} \text{Civilian Population}: &\quad 125,000, \\ \text{Employed}: &\quad 95,000, \\ \text{Unemployed}: &\quad 5,000, \\ \text{Discouraged}: &\quad 18,750, \\ \text{Marginally Attached}: &\quad 20,000, \\ \text{Part-Time}: &\quad 3,000, \end{aligned}$$

find the unemployment rate that includes discouraged workers.

Answer 3. We expand the pool of people under consideration by 18,750, the number of discouraged workers. This yields

$$\frac{\text{unemployed} + \text{discouraged}}{\text{labor force} + \text{discouraged}} = \frac{5,000 + 18,750}{100,000 + 18,750} = 20\%.$$

Problem 4. For a country with the following data,

$$\begin{aligned} \text{Civilian Population}: &\quad 125,000, \\ \text{Employed}: &\quad 95,000, \\ \text{Unemployed}: &\quad 5,000, \\ \text{Discouraged}: &\quad 18,750, \\ \text{Marginally Attached}: &\quad 20,000, \\ \text{Part-Time}: &\quad 3,000, \end{aligned}$$

find the unemployment rate that includes marginally attached workers.

Answer 4. We expand the pool of people under consideration by 20,000, the number of marginally attached workers (which includes discouraged workers). This yields

$$\frac{\text{unemployed} + \text{marginally attached}}{\text{labor force} + \text{marginally attached}} = \frac{5,000 + 20,000}{100,000 + 20,000} = 20.83\%.$$

Problem 5. For a country with the following data,

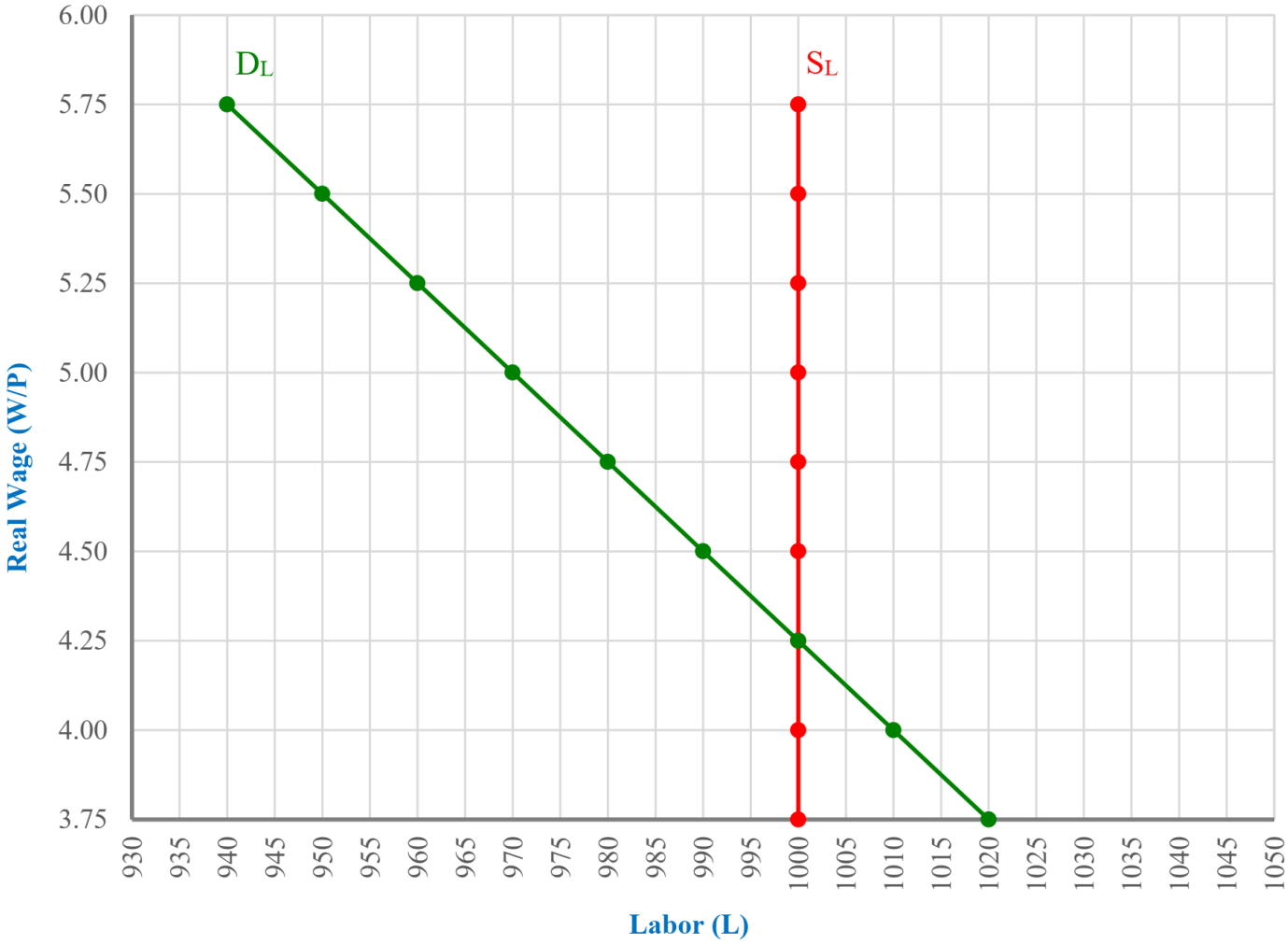
$$\begin{aligned} \text{Civilian Population}: &\quad 125,000, \\ \text{Employed}: &\quad 95,000, \\ \text{Unemployed}: &\quad 5,000, \\ \text{Discouraged}: &\quad 18,750, \\ \text{Marginally Attached}: &\quad 20,000, \\ \text{Part-Time}: &\quad 3,000, \end{aligned}$$

find the unemployment rate that includes marginally attached and part-time workers.

Answer 5. Expand the pool of people under consideration by 20,000, the number of marginally attached workers. Also add part-time workers to the numerator; since part-time workers are already employed, they count as part of the labor force, and hence there is no need to add them to the denominator. We then get

$$\frac{\text{unemployed} + \text{marginally attached} + \text{part-time}}{\text{labor force} + \text{marginally attached}} = \frac{5,000 + 20,000 + 3,000}{100,000 + 20,000} = 23.33\%.$$

Problem 6. $u_f = 2\%$, $u_s = 0\%$, Okun's $\alpha = 2$, and potential GDP = 125,000.

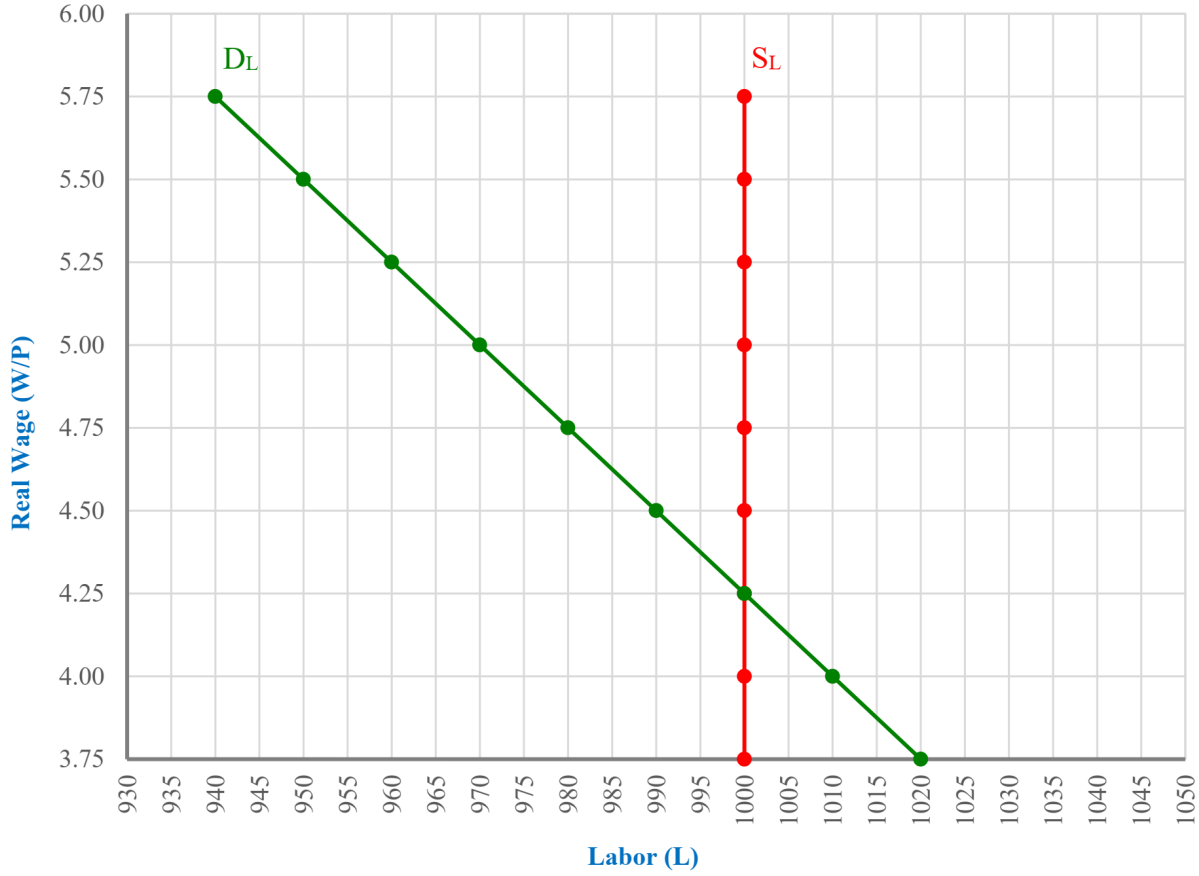


$W = \$425$ and $P = \$100$. This must mean that in this country the cyclical rate of unemployment equals _____ percent and real GDP equals _____ units.

Answer 6. The real wage is 425/100 = 4.25, which means the labor market is in equilibrium. Therefore the cyclical rate of unemployment is $u_c = 0$. By definition, real GDP equals potential, $Y = Y_p = 125,000$.

Note that even though there are as many jobs available as people who want jobs, there are still $0.02 \times 1,000 = 20$ frictionally unemployed workers.

Problem 7. $u_f = 2\%$, $u_s = 0\%$, Okun's $\alpha = 2$, and potential GDP = 125,000.



Originally, $W = \$425$ and $P = \$100$. The stock market crashes and people buy fewer goods and services. This causes the nominal wage to fall by 8% and the price level to fall by 32%. This must mean that in this country the cyclical rate of unemployment equals _____ percent and the real GDP equals _____ units.

Answer 7. The real wage will be

$$\frac{(0.92)425}{(0.68)100} = 5.75.$$

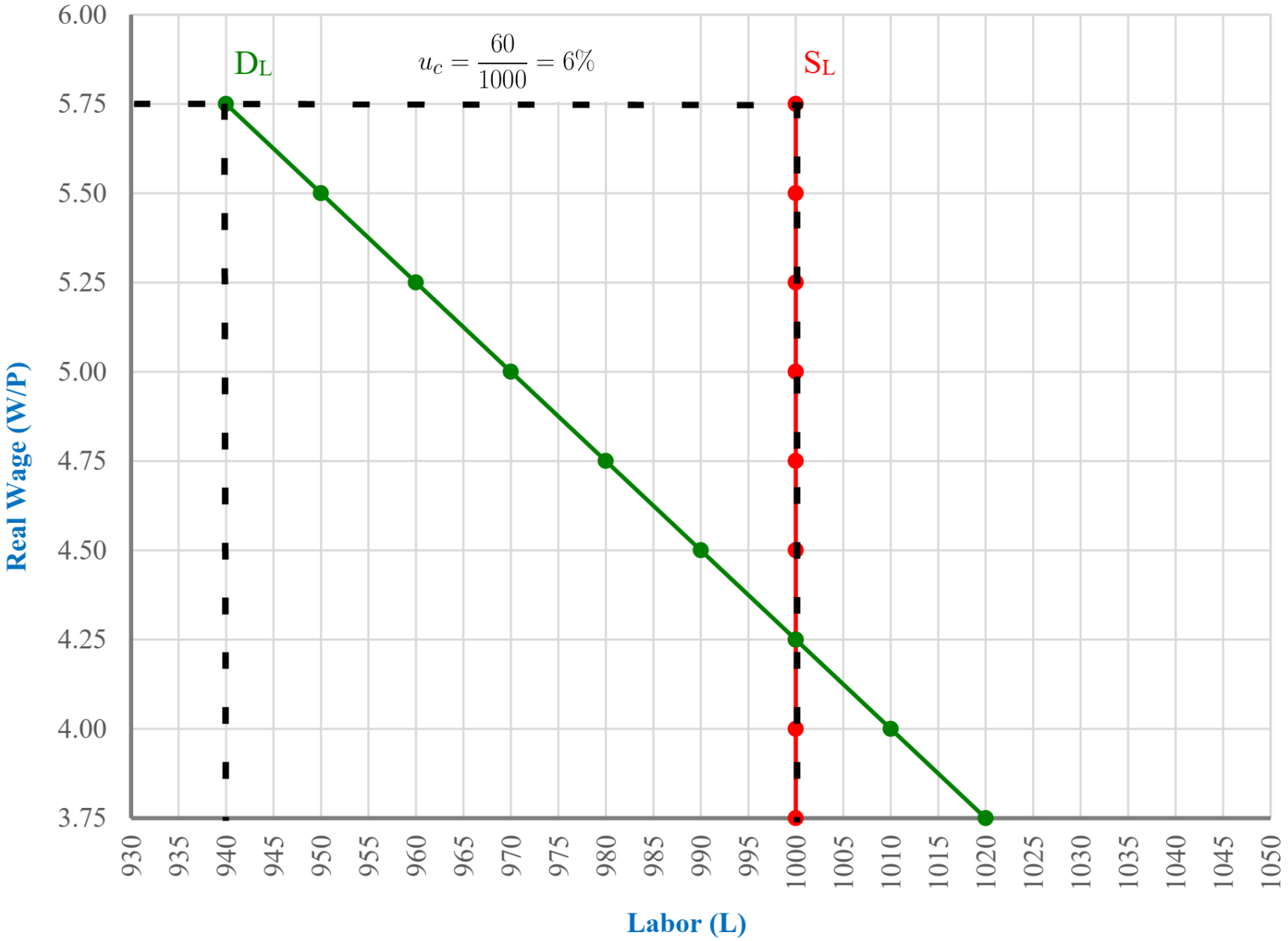
This means we have 940 jobs available and 1000 people who want jobs. That means there are no jobs available for 60 workers because the real wage is above the equilibrium real wage. Since structural unemployment is zero, it means the only thing that is causing the real wage to be above equilibrium is the stock market crash; therefore all 60 workers with no available jobs are cyclical unemployment. So $u_c = 60/1000 = 6\%$.

We use Okun's law to find real GDP. The formula is

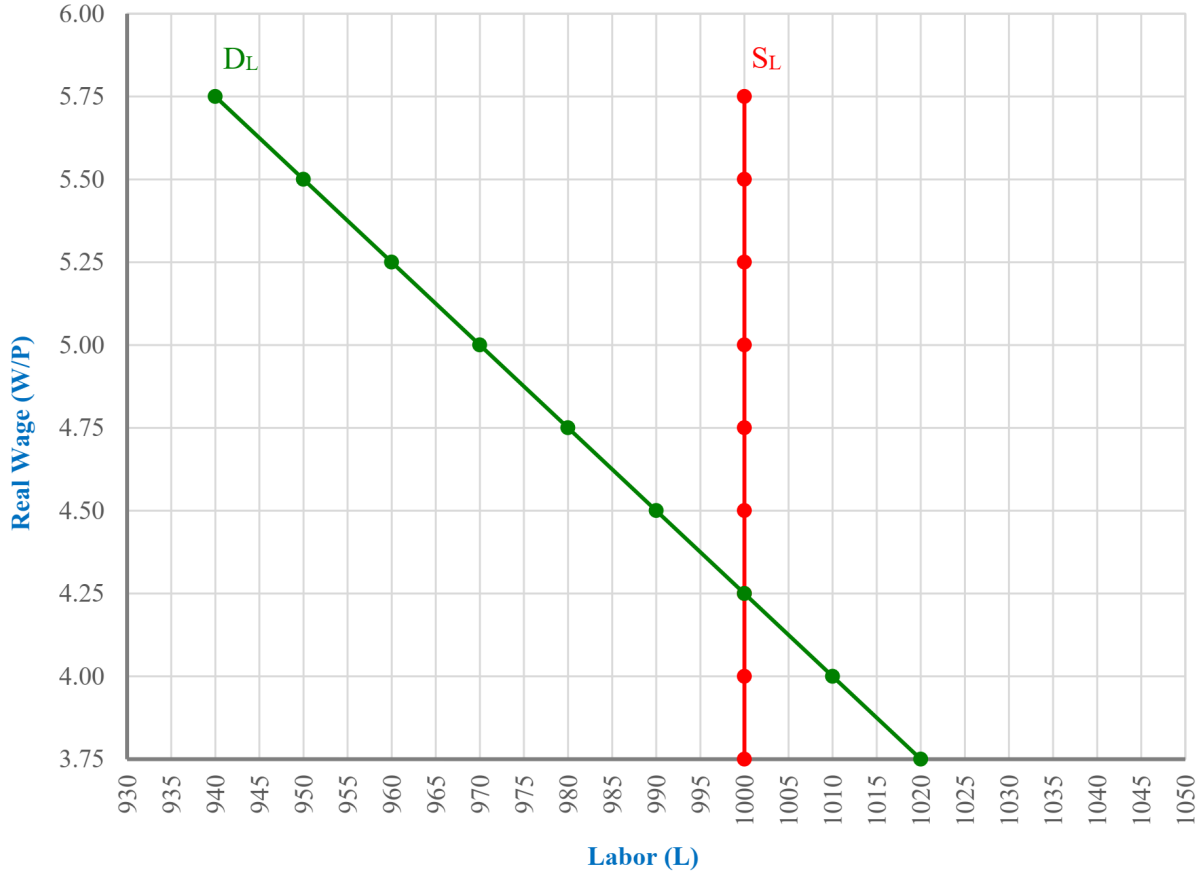
$$\frac{Y_p - Y}{Y_p} = \alpha \times u_c \implies \frac{125,000 - Y}{125,000} = 2 \times 0.06 \implies Y = 110,000.$$

Note that this is below potential GDP. The lesson: below-potential GDP and positive cyclical unemployment are equivalent.

The graph is shown on the next page.


6.00
5.75
5.50
5.25
5.00
4.75
4.50
4.25
4.00
3.75
Real Wage (W/P)
930
935
940
945
950
955
960
965
970
975
980
985
990
995
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
Labor (L)
DL
$u_c = \frac{60}{1000} = 6\%$
SL

Problem 8. $u_f = 2\%$, $u_s = 0\%$, Okun's $\alpha = 2$, and potential GDP = 125,000.



Originally, $W = \$425$ and $P = \$100$. The stock market rallies and people buy more goods and service. This causes the nominal wage to increase by 28% and the price level to increase by 36%. This must mean that the cyclical rate of unemployment equals _____ percent and the real GDP equals _____ units.

Answer 8. The real wage will be

$$\frac{(1.28)425}{(1.36)100} = 4.00.$$

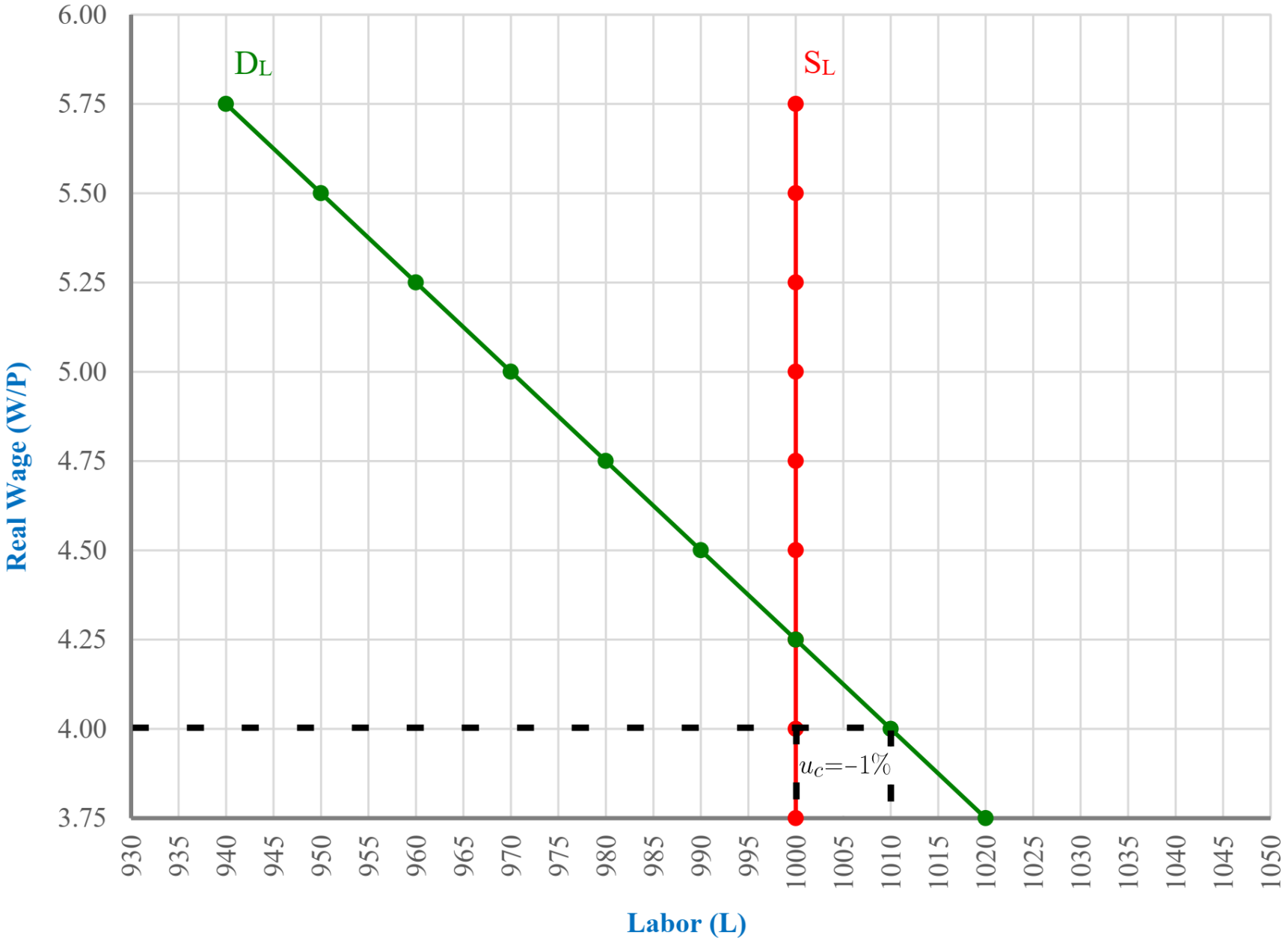
This means we have 1010 jobs available and 1000 people who want jobs. That means there are no workers available for 10 jobs because the real wage is below the equilibrium real wage. Since structural unemployment is zero, it means the only thing that is causing the real wage to be different from equilibrium is the stock market rally; therefore all 10 unfilled jobs constitute *negative* cyclical unemployment (i.e. there is an *excess* of jobs). So $u_c = -10/1000 = -1\%$.

We use Okun's law to find real GDP. The formula is

$$\frac{Y_p - Y}{Y_p} = \alpha \times u_c \quad \Longrightarrow \quad \frac{125,000 - Y}{125,000} = 2 \times -0.01 \quad \Longrightarrow \quad Y = 127,500.$$

Note that this is *above* potential GDP. The lesson: above-potential GDP and negative cyclical unemployment are equivalent.

The graph is shown on the next page.


6.00
5.75
5.50
5.25
5.00
4.75
4.50
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4.00
3.75
Real Wage (W/P)
DL
SL
u_c=-1%
930
935
940
945
950
955
960
965
970
975
980
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990
995
1000
1005
1010
1015
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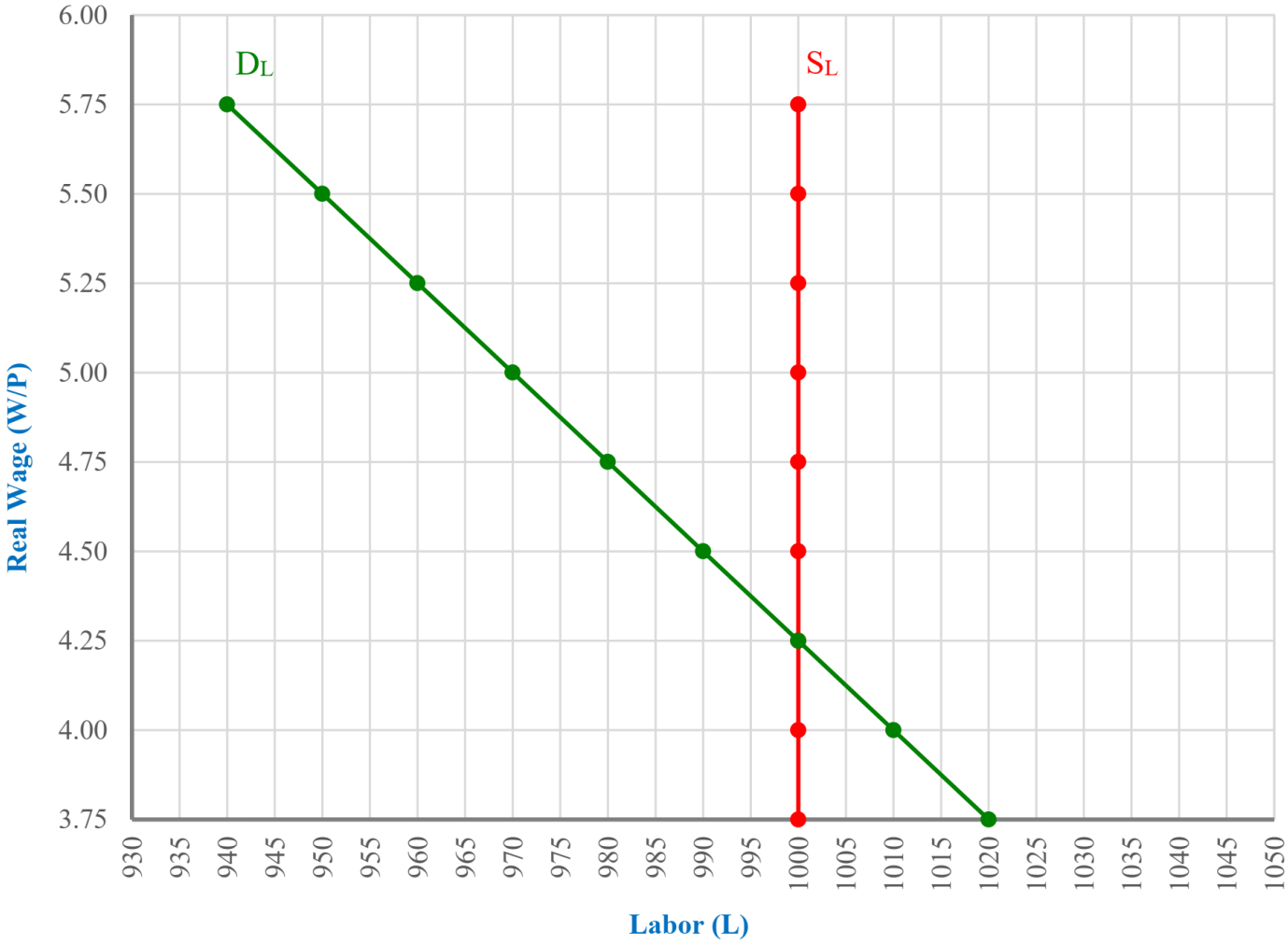
Labor (L)

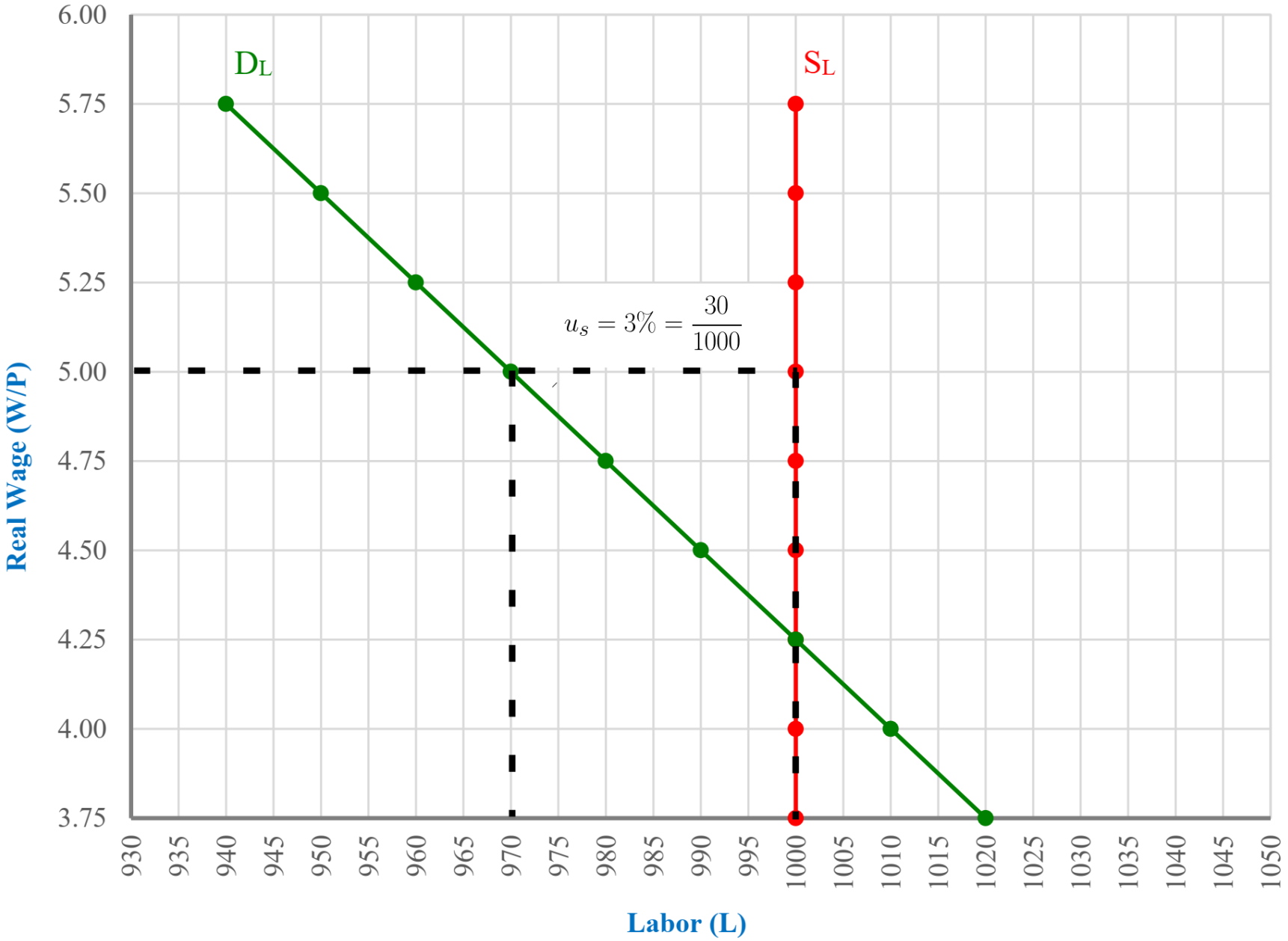
Problem 9. $u_f = 2\%$, $u_s = 3\%$, Okun's $\alpha = 2$, and potential GDP = 100,000.



$W = \$500$ and $P = \$100$. This must mean that in this country the cyclical rate of unemployment equals _____ percent and real GDP equals _____ units.

Answer 9. Since there is structural unemployment of 3%, that means there are $0.03 \times 1,000 = 30$ structurally unemployed workers. This means the real wage in the absence of any cyclical unemployment must be $W/P = 5$, because that's the real wage at which only 970 jobs are available for 1000 workers (that is, there are no jobs available for 3% of them). We're told that the real wage actually is $500/100 = 5$. We conclude that there are zero cyclically unemployed workers, implying $Y = Y_p = 100,000$.

Hey guess what: the graph is shown on the next page.


6.00
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5.00
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Real Wage (W/P)
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SL
$u_s = 3\% = \frac{30}{1000}$
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1050
Labor (L)