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## ECO325S: Advanced Economic Theory-Macro

### Problem Set #5

1. Romer 4.4
2. Romer 4.5
3. Romer 4.6
4. Romer 4.8
5. One definition of Okun's law says that the gap between the economy's full employment level of output and its actual level increases by 3% for each 1% increase in the unemployment rate relative to the natural rate of unemployment. In other words:

$$\frac{\bar{Y} - Y}{\bar{Y}} = 3.0(u - \bar{u})$$

where  $\bar{Y}$  is the level of potential output (i.e., the level consistent with normal growth),  $Y$  is the actual level of output, and  $u$  is the actual level of unemployment. Show that if  $\frac{Y}{\bar{Y}}$  is approximately equal to 1, and the natural rate of unemployment,  $\bar{u}$ , does not change over time (i.e.,  $\frac{\partial \bar{u}}{\partial t} = \dot{\bar{u}} = 0$ ), then we can express Okun's law as:

$$\frac{\dot{Y}}{Y} - \frac{\dot{\bar{Y}}}{\bar{Y}} = -3.0 \dot{u}$$

that says that a one percent increase in the unemployment rate is equivalent to 3 percent shortfall in the growth rate of actual output relative to the normal growth rate of output.