Part I: 16 points. Multiple Choice questions.

Circle the letter corresponding to the correct answer for each of the following multiple choice questions. Each question is worth 2 points, so Part I is worth 16 points.

1. The natural level of output, Y_n, is
   A. lower when the natural rate of unemployment, u_n, is lower.
   B. higher when the markup increases.
   C. the level of output when the goods and money market are both in equilibrium.
   D. the level of output when the IS-LM model is in equilibrium.
   E. none of the above

2. Property 1 of the AS Relation
   A. says for a given P^e, a decrease in output leads to a decrease in the price level.
   B. tells us that the AS curve will be upward sloping.
   C. tells us that the AD curve will be downward sloping.
   D. All of the above.
   E. A and B only.
   F. A and C only.

3. When the unemployment rate decreases, bargaining power:
   A. decreases for both skilled and unskilled workers.
   B. increases for both skilled and unskilled workers.
   C. increases for unskilled workers but not skilled workers.
   D. decreases for unskilled workers but not skilled workers.
   E. is unchanged because workers' skill sets have not changed.

4. Collective bargaining:
   A. plays a much larger role in wage determination in the United States than in Europe.
   B. is bargaining between a union (or group of unions) and a firm (or industry).
   C. is the only way for workers to have bargaining power.
   D. all of the above

5. Which of the following best characterized how individuals formed expectations of inflation after the 1970s?

   A. Expected inflation for the current year was smaller than the previous year's inflation rate.

   B. Expected inflation for the current year was approximately equal to the previous year's inflation rate.

   C. Expected inflation for the current year was greater than the previous year's inflation rate.

   D. Expected inflation for the current year equal to the average inflation rate over the past five years.

   E. Expected inflation for the current year equal to the average inflation rate over the past ten years.

6. The Phillips curve shows that when the unemployment rate is lower than the natural rate

   A. inflation is higher than expected.

   B. inflation is lower than expected.

   C. policy rate is higher than expected.

   D. policy rate is lower than expected.

7. The zero lower bound refers to the situation that

   A. the lowest the central bank can decrease the nominal policy rate is 0

   B. real interest rate is 0

   C. inflation rate is 0

   D. risk premium is 0

8. When the policy rate increases,

   A. IS curve does not change.

   B. IS curve shifts to the right.

   C. IS curve shifts to the left.

   D. LM curve shifts upward.

   E. LM curve shifts downward.

Part II: 26 points. True/False questions and Short Answer.

Circle **T** for true of **F** for false for each of the following True/False questions and briefly explain your answer in the space provided. (1)-(7) is worth 3 points and question (8) is worth 5 points for a total of 21 points in this section.

1. **T** **F** Money is always neutral in the Short Run

2. **T** **F** In order to draw the AS curve, we assume that $P^e = P$.

3. Using the Price Setting relation

$$P = (1 + m)W$$

show the effect of decreased competitiveness (higher monopoly power) on real wage.

4. What is technological unemployment? Has it been a problem for the US in the past?

5. There are some concerns that technological progress can lead to an increase in unemployment. Explain the two related but separate dimensions of technological progress.

6. For this question, assume that expectations of productivity growth adjust slowly. Now, suppose that there is a 5% increase in productivity. Explain how this 5% increase in productivity can cause changes in the unemployment rate.

7. Explain what effect a reduction in productivity has on wage setting behavior, price setting behavior, the equilibrium real wage, the natural rate of unemployment, and the natural level of output.

8. When (exact time and date) is the final for this class? Where will it be held?

Part III: 50 points. Analytical.

1. (15 points) *The Phillips Curve*
   Recall: The linearized Phillips Curve is given by the following relationship:

$$\pi_t = \pi_t^e + (m + z) - \alpha u_t$$

and inflation, π_t and expected inflation, π_t^e are given by:

$$\begin{aligned} \pi_t &= \frac{P_t - P_{t-1}}{P_{t-1}} \\ \pi_t^e &= \frac{P_t^e - P_{t-1}}{P_{t-1}} \end{aligned}$$

   (a) (3 points) Define Static Inflation Expectations and derive the Original Phillips Curve.

   (b) (3 points) Define Adaptive Inflation Expectations and derive the Modified Phillips Curve.

(c) (3 points) Give one reason why the Original Phillips Curve failed.

(d) (3 points) Assume $P_t = P_t^e$. Solve for the natural rate of unemployment.

(e) (3 points) Explain in your own words why the inflation expectations are so important in the model and in the real world. (*Hint:* Think about how inflation and labor market are related).

2. (20 points) *Technological Progress and Unemployment*
Suppose an economy is characterized by the following equations:

$$\text{Price Setting} \qquad P = (1+m)(W/A)$$

and

$$\text{Wage Setting} \qquad W = A^e P^e (1 - u + 3z)$$

(a) (5 points) Solve for u if $P^e = P$ but $A^e \neq A$. Explain the effects of A^e/A on u.

(b) (5 points) Show graphically what will happen if A increases above expectations.

(c) (5 points) Now suppose $A^e = A$. Solve for the natural rate of unemployment if $m = 5\%$ and $z = 0$

(d) (5 points) Does the natural rate of unemployment depend on productivity? Explain.

3. (15 points) Consider the typical IS-LM set-up from Chapter 5. The IS relation is given by $Y = C(Y - T) + I(Y, i) + G$ and the LM relation is given by $\frac{M}{P} = Y\ L(i)$. Suppose the economy is in a short run equilibrium at some point A. The government decides to perform **contractionary** fiscal policy by increasing taxes.

   (a) (7 points) Draw the effect this policy this policy will have in the IS-LM framework (1 graph). Label all axes, curves, the new and the old equilibrium.

(b) (4 points) Using your graph from part (b), describe the equilibrium change in 4 variables listed below following a money supply decrease:

Output:

The interest rate:

Consumption:

Investment:

(c) (4 points) Following the increase in T, is it possible for the Fed to stimulate the economy enough for it to return to the original level of output using monetary policy in the IS-LM model? Explain intuitively and draw the IS-LM graph.