Question 1: AD-AS (30 points)

Consider the following closed economy:

\[ C_d = 200 + 0.5(Y - T) - 200r \] (consumption)
\[ I_d = 250 - 300r \] (investment)
\[ L = 0.5Y - 500i \] (real money demand)
\[ \bar{Y} = 1000 \] (full employment output)
\[ \pi^e = 0 \] (expected inflation)

Suppose \( G = T = 200 \), and \( M = 4500 \).

1. Derive an equation for the IS curve. (5 points)
2. Derive an equation for the LM curve. (5 points)
3. Derive an equation for the aggregate demand curve. (5 points)
4. What are the long run equilibrium values of output, consumption, investment, the real interest rate, and price level? (5 points)
5. Following any shock to the economy, price setting firms are incapable of adjusting prices for one period (they must supply any level of demanded output at the prevailing
price level), after which price adjustment is fully flexible. Calculate the short-run and long-run impact on $Y$ and $P$ when the Federal Reserve unexpectedly expands the money supply to $M = 5000$. Graph the AS-AD dynamics. (10 points)

**Question 2: (15 points)**

What is the cyclical behavior of the real wage and labor productivity? What do the following business cycle theories predict about the cyclical behavior of the real wage, and is it consistent with the data?

a. The Real Business Cycle Theory (5 points)

b. The New-Keynesian Theory of Sticky Wages. (5 points)

c. The New-Keynesian Theory of Sticky Prices. (5 points)

**Question 3: (15 points)**

Comment on the following statement: “The Solow residual is strongly positively correlated with output growth. This means that output fluctuations are predominantly caused by exogenous productivity shocks.”

**Question 4: Macro Concepts (15 points)**

Provide brief explanations for the following

(a) Phillips curve (5 points)

(b) Crowding Out (5 points)

(c) Policy Ineffectiveness Proposition (5 points)