Question 1: Inflation Expectations and Real Money Demand (20 points)

Suppose that the real money demand function is \[ L(y, r + \pi^e) = \frac{y^{0.5}}{r + \pi^e} \] where \( y \) is real per capita output, \( r \) is the real interest rate, and \( \pi^e \) is the expected rate of inflation. Real per capita output is constant at its steady state level, \( y^* = 10,000 \). The real interest rate is also constant at its steady state rate \( r^* = 4\% \) per year.

(a) Suppose that the nominal money supply is growing at the rate of 2\% per year and that this growth rate is expected to persist forever. Currently the nominal money supply is \( M^s = 5,000 \). What are the values of the real money demand and the current price level? (5 points)

(b) The central bank now announces that from now on the nominal money supply will grow at the rate of 4\% per year. If everyone believes this announcement, and if markets are in equilibrium, what are the values of real money demand and the current price level? Assume that the initial nominal money supply is again \( M^s = 5,000 \). (5 points)

(c) Explain the effects of such an increase in the rate of money growth on real money demand and the price level. (5 points)

(d) If real per capita output jumps above its steady state level, how will nominal money demand respond? What is the elasticity of money demand with respect to income, \( \varepsilon_y \), and what value does it take here? (5 points)
Question 2: The Solow Growth Model (25 points)

Consider a closed economy where goods are produced according to
\[ Y_t = AK_t^\alpha (E_tN_t)^{1-\alpha} \]
where \( Y_t \) is output, \( K_t \) is the capital stock, \( E_t \) is labor efficiency and \( N_t \) is labor input. Households save a constant fraction \( s \) of current income \( Y_t \), capital depreciates at a rate \( \delta \), the population grows at a constant rate \( n \) and labor efficiency \( E_t \) grows at a constant rate \( g \).

(a) Derive the “per effective worker” production function. (5 points)

(b) Derive a dynamic equation that describes how \( k_t \), the capital stock per effective worker, evolves over time. (5 points)

(c) Suppose \( A = 1 \), \( \alpha = 0.5 \), \( s = 0.40 \), \( \delta = 0.05 \), \( n = 0.01 \), \( g = 0.04 \). What is \( k^* \), the steady state value of \( k_t \)? (5 points)

(d) What is the Golden Rule level of the capital-effective labor ratio \( k_{gold}^* \)? What is the growth rate of consumption per capita \( \frac{C}{N} \) when \( k = k_{gold}^* \)? (5 points)

(e) Describe how you as a policymaker would act to achieve \( k_{gold}^* \). (5 points)

Question 3: Labor Market (15 points)

(a) In the classical model of the labor market, what happens to real wages and aggregate labor supply when there is an announcement of a future permanent decrease in labor taxes? (5 points)

(b) State some reasons why, in practice, there is always unemployment. (5 points)

(c) Explain why in the US the natural rate of unemployment rose during 1960-1984, and fell during 1985-2006. (5 points)

Question 4: Macro Concepts (15 points)

Provide brief explanations for the following

(a) Okun’s law (5 points)

(b) Ricardian equivalence (5 points)

(c) Great Moderation (5 points)