

NAME:

ECON 573/ ECON 603
Macroeconomic Theory I
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Midterm

1. (35 points) Suppose that utility function U of a representative agent is $U = C^\alpha \cdot \ell^{1-\alpha}$, where C is consumption of physical goods and ℓ is consumption of leisure. Suppose that production technology is represented by $Y = K^\alpha \cdot N^{1-\alpha}$ where K is physical capital stock, and N is labor stock. We assume that $\bar{h} = \ell + N$, ω is the real wage, and π is real profit. There is no government in the economy. Find the optimal values of C , ℓ , N , ω , Y , and U . Hint: You may assume one of the following: $K = \bar{K}$ (the short run interpretation) or K is variable (the long run interpretation).

2. (40 points) Suppose the production function of an economy is characterized by a production function in the form $Y_t = K_t^\alpha \cdot N_t^{1-\alpha}$, $N_t = N_0 \cdot e^{n \cdot t}$, $N_0 = 1$. Using the **fundamental equation of growth of Solow**:

- (15 Points)** Find the steady state values of k_t , y_t , and c_t .
- (15 Points)** Analyze the transitional dynamics of the model by graphical approach.
- (10 Points)** Analyze the response of y_{ss} obtained in (a) to changes in s , n , and α .

3. (35 points) Suppose the economy is characterized by a production function in the form $Y_t = K_t^\alpha \cdot N_t^{1-\alpha}$, where $N_t = N_0 \cdot e^{n \cdot t}$, $N_0 = 1$, $n > 0$, and an overall utility function $U(c) = \int_0^\infty e^{-(\rho-n)t} \cdot u(c_t) dt$, where the instantaneous utility function belongs to the constant elasticity of intertemporal substitution (CIES) class: $u(c_t) = \frac{c_t^{1-\theta}}{1-\theta}$, $\theta > 0$.

- (10 points)** Solve the household's intertemporal utility maximization problem.
- (10 points)** Solve the firm's profit maximization problem.
- (10 points)** Solve the model at the steady state and find the (long-run) equilibrium values of capital, output, and consumption.
- (5 points)** Formulate the same problem by using the social planner's approach.