

ECON 405
ECONOMIC GROWTH AND DEVELOPMENT
Dr. Yetkiner

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FINAL EXAM

1. (60 points) Suppose the economy is characterized by a production function $Y_t = K_t^\alpha \cdot L_t^{1-\alpha}$, where $L_t = L_0 \cdot e^{nt}$, $L_0 = 1$ and $n > 0$ and an overall utility function $U(c_t) = \int_0^\infty e^{-(\rho-n)t} u(c_t) dt$, where the instantaneous utility function $u(c_t)$ belongs to the constant elasticity of intertemporal substitution (CIES) class: $u(c_t) = \frac{c_t^{1-\theta} - 1}{1-\theta}$, $\theta > 0$.

a. (20 points) Solve the household's intertemporal utility maximization problem and derive the equations of motions that describe intertemporal utility maximization.

b. (10 points) Solve the firm's profit maximization problem.

c. (10 points) Solve the model at the steady state and find the equilibrium values of capital, output, and consumption.

d. (10 points) Formulate the same problem by using the social planner's approach.

e. (10 points) Suppose now that you are given the following parameter values: $\alpha = 0.5$, $\theta = 2$, $\rho = 0.05$, $n = 0.02$, $L_0 = 1$, $\delta = 0.05$. Calculate the steady state values of capital per capita, output per capita, and consumption per capita.

2. (40 points) Suppose that a social planner has the following optimization problem:

$$U = \int_0^{\infty} e^{-\rho t} \frac{C_t^{1-\theta} - 1}{1-\theta} dt$$
$$Y_t = A \cdot K_t$$
$$\dot{K}_t = Y_t - C_t$$

C , Y and K represent consumption, output and the capital stock, respectively. $A > 0$ is productivity parameter, ρ is the subjective rate of discount, and $1/\theta$ is the intertemporal elasticity of substitution for consumption. We assume that $\rho > 0$, $0 < \theta$, and $A > \rho$. Solve the model.