

ECON 405

Economic Growth and Development

14 April 2015

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Midterm Exam

The Solow Model of Economic Growth

1. (50 Points) Suppose the production function of an economy is characterized by

$$Y = F(K, L) = K^\alpha \cdot L^{1-\alpha}.$$

a. (10 Points) What is the intensive form of the production function?

b. (10 Points) Find the equation for the steady-state level of k from the fundamental equation of growth, assuming that $\delta > 0$, $n > 0$ and $I = sY$.

c. (10 Points) Find consumption per worker at steady state, c_{ss} .

d. (10 Points) What is the “golden rule of capital accumulation” / “golden saving rate”?

e. (10 Points) Suppose $s = 0.24$, $\alpha = 0.25$, $\delta = 0.04$, and $n = 0.02$. Find k_{SS} , y_{SS} , and c_{SS} .

2. (20 Points) Let the law of motion for A be given by $\dot{A} = M - N$, where $M(t) = e^{mt}$, $N(t) = e^{nt}$ and $m = 2 \cdot n$. Find the growth rate of A in the steady state.

3. (20 Points) Suppose that aggregate production function of an economy is characterized by $Y = \left[a \cdot K^{-\alpha/(1-\alpha)} + b \cdot E^{-\alpha/(1-\alpha)} + (1-a-b) \cdot L^{-\alpha/(1-\alpha)} \right]^{(\alpha-1)/\alpha}$, where Y is output, K is capital, L is labor, E is energy and a , b and $1-a-b$ are share parameters. Determine (i) whether this production function features constant, increasing or decreasing returns to scale; (ii) show that it does not satisfy one of the two Inada conditions, say, for energy.

4. (20 Points) Suppose that production function is $y = k^{1.2}$, where y is income per capita and k is capital per capita. Analyze the stability conditions of the Fundamental Equation of Growth (of Solow) through graphical analysis.