

Econ 522: Intermediate Macroeconomics, Fall 2017
Chapters 8 and 9 Economic Growth Practice Problems

1. Draw the Solow model diagram, label all of the curves and axes.
 - (a) Label the steady state level of capital per worker k^* .
 - (b) Pick a value greater than k^* and label it k_1 . Explain in words what will happen to k over time if the economy starts at k_1 ?
 - (c) Pick a value less than k^* and label it k_2 . Explain in words what will happen to k over time if the economy starts at k_2 ?
2. Economy's aggregate production function: $Y = F(K, L) = \sqrt{K \times L} = K^{1/2}L^{1/2}$. Let $s = 0.3$, $\delta = 0.1$, and the initial value of $k = 4$. Assume there is no population growth.
 - (a) Use the Solow model equation of motion ($\Delta k = s f(k) - (\delta + n)k$) to solve for the steady-state values of k , y , and c .
 - (b) What happens when the savings rate increases to 0.4 (show on a graph and explain in words)? Find the steady state levels of capital per worker, and of output per worker. Are they higher or lower than before?
3. Country A and B both have the production function: $Y = K^{1/3}L^{2/3}$.
 - (a) Does the production function have constant returns to scale?
 - (b) What is the per-worker production function?
 - (c) Assume neither country has any population growth or technological progress and 20 percent of capital depreciates each year. Country A saves 10 percent of its output each year. Country B saves 30 percent of its output each year. Find steady state capital per-worker for both. Then find steady state levels of income per-worker and consumption per-worker.
 - (d) If both start with capital stock per-worker of 1 (say in year 1), what are the levels of income per-worker and consumption per-worker in year 1? What will they be in year 2?
 - (e) Show how the capital stock per-worker will evolve over time for both. Find y and c for each year. How long until B has higher consumption per worker than A.
4. Draw the Solow model diagram where the economy begins with a steady state level of capital per worker k^* that is below the golden rule level k_g^* . Label both k^* and k_g^* .
 - (a) What change could cause the economy to move to k_g^* ?
 - (b) Describe the transition that would take place if that occurred.
5. Draw a Solow model diagram with population growth, showing an economy in steady state. Use the graph to determine what happens to steady state capital per-worker and steady state income per-worker in response to each of the following exogenous changes.
 - (a) Pessimism about nation's the future following elections changes consumer preferences so as to increase the savings rate.
 - (b) Changing weather patterns that result in more frequent and serious storms increase the depreciation rate.
 - (c) Better birth-control methods reduce the rate of population growth.
 - (d) A one-time, permanent improvement in technology increases the amount of output that can be produced from any given amount of capital and labor.