

Economics 362, Macroeconomic Theory

Problem set on Solow Model

For this problem set you will need Excel or a calculator that can take roots (e.g., what is the value of $\sqrt[3]{4}$?).

Suppose an economy's aggregate production function is $Y = K^{1/4} L^{3/4}$. Its depreciation rate is ten percent per year (one-tenth of the capital stock disappears each year through depreciation). The labor force (population) is stable, not growing.

- 1) What is the “per-worker” production function that relates output per worker y to capital per worker k ?
- 2) Suppose that the savings rate s in the economy is three-tenths (0.3 or 3/10). Find k^* , the long-run steady state value of k . I am looking for a number here.
- 3) Suppose the savings rate rises to one-half (0.5 or 1/2). What is the new value of k^* ? I am looking for a number here.
- 4) Using a graph that has k on the horizontal axis and y on the vertical axis, show what happens to capital per worker k and consumption per worker c in the *long run* when the savings rate rises from three-tenths to one-half. Denote the original values of k^* and c^* by k_1^* and c_1^* . Denote the new values of k^* and c^* by k_2^* and c_2^* . Also show what happens to k and c in the short run, *immediately after* the increase in the savings rate. Use k_{SR} and c_{SR} to denote the values of k and c immediately after the increase in the savings rate.
- 5) What is the marginal product of capital in this economy as a function of k ? Hint: recall that the marginal product of capital is equal to the slope of the per-worker production function $\partial y / \partial k$, and *use calculus*.
- 6) What is the “golden rule” value of k^* in this economy, that is what is k_{gold}^* ? I am looking for a number here.