Assignment 3: Econ Growth 1

Question 1

Country A and country B both have the production function

$$Y = F(K, L) = K^{1/3}L^{2/3}$$

a. Does this function have constant returns to scale? Explain.

b. What is the per-worker production function?

c. Assume that neither country experiences population growth or technological progress and that 20 percent of capital depreciates each year. Assume further that country A saves 10 percent of output each year and country B saves 30 percent of output each year. Using your answer from part (b) and the steady-state condition that investment equals depreciation, find the steady-state level of capital per-worker for each country. Then find the steady-state levels of income per worker and consumption per worker.

d. Suppose that both countries start off with a capital stock per worker of 1. What are the levels of income per worker and consumption per worker?

Question 2

"Devoting a large share of national output to investment would help restore rapid productivity growth and rising living standards." Do you agree with this claim? Explain using the Solow model.

Question 3

Draw a well-labeled graph that illustrates the steady state of the Solow model with population growth. Use the graph to find what happens to steady-state capital per worker in response to each of the following exogenous changes.

a. A change in consumer preferences increases the saving rate.

b. A change in weather patterns increases 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.

Question 4

Many demographers predict that the United States will have zero population growth in the coming decades, in contrast to the historical average population growth of about one percent per year. Use the Solow model to forecast the effect of this slowdown in population growth on the growth of output per person. Consider the effects both in the steady state and in the transition between steady states.