

Problem Set B2

Econ 302 - Haworth

Due date: Tuesday, July 28 (by 11:59pm)

1. Country X and Country Y have the following production function: $Y = F(K, L) = \sqrt{K \cdot L}$

- Does this production function have constant returns to scale? Explain.
- What is the per-worker production function (i.e. $y = f(k)$ from lecture)?
- Assume that neither country experiences any population growth or technological change, and that 5% of capital depreciates each year. Assume further that Country X saves 10% of output each year and Country Y saves 20% 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.

2. “Devoting a larger share of national output to investment would help restore rapid productivity growth and rising living standards (i.e. rising consumption).” Do you agree with this claim? Explain using the Solow model from lecture.

3. Draw a well-labeled graph that illustrates the steady-state of the Solow model from class and include population growth. Use the graph to find what happens to steady-state capital per worker (k) and income per worker (y) in response to each of the following changes.

- A change in consumer preferences increases the savings rate.
- A change in weather patterns increases the depreciation rate.
- Better birth-control methods reduce the rate of population growth.
- A one-time, permanent improvement in technology increases the amount of output that can be produced from any given amount of capital and labor.

4. Many demographers predict that the U.S. will have zero population growth in the 21st century, in contrast to average population growth of about 1% per year in the 20th century. Use the Solow model from class to forecast the effect of this slowdown in population growth on k^* .