Exercises Week 3 To be submitted Monday January 29 at 10h00.

Question 1:

A country is described by the Solow model, with a production function of $y = k^{1/2}$. Suppose that k is equal to 400. The fraction of output invested is 50%. The depreciation rate is 5%. Is the country at its steady-state level of output per worker, above the steady state, or below the steady state? Show how you reached your conclusion.

Question 2:

In this exercise, you can simply ignore the comment about productivity. Note that you must find the <u>ratio</u> of steady-state per-capita outputs. The answer to question 5 of Chapter 15 from last week should help you answer this question.

In Country 1 the rate of investment is 5%, and in Country 2 it is 20%. The two countries have the same levels of productivity, A, and the same rate of depreciation, δ . Assuming that the value of α is 1/3, what is the ratio of steady-state output per worker in Country 1 to steady-state output per worker in Country 2? What would the ratio be if the value of α were 2/3?

Question 3:

Suppose that there are no investment flows among countries, so that the fraction of output invested in a country is the same as the fraction of output saved. Saving in an economy is determined as follows: There is a subsistence level of consumption per worker, c^* . If income per worker is equal to c^* , people will consume all of their income. All income per worker in excess of c^* will be split between consumption and investment, with a fraction γ going to investment and the rest going to consumption. Use a diagram like Figure 3.4 to analyze the steady states of this economy.

NB Figure 3.4 here is the same as Figure 15-2 in Blanchard & Johnson.

Question 4:

NB Ignore the comment about the value of A.

The following tables show data on investment rates and output per worker for three pairs of countries. For each country pair, calculate the ratio of GDP per worker in steady state that is predicted by the Solow model, assuming that all countries have the same values of A and δ and that the value of α is 1/3. Then calculate the actual ratio of GDP per worker for each pair of countries. For which pairs of countries does the Solow model do a good job of predicting relative income? For which pairs does the Solow model do a poor job?

Country	Investment Rate (Average 1960-2000)	Output per Worker in 2000
Thailand	29.4%	\$12,086
Bolivia	10.1%	\$7,152
	Investment Rate	Output per Worker
Country	(Average 1960-2000)	in 2000
Nigeria	7.5%	\$1,906
Turkey	14.9%	\$15,726
	Investment Rate	Output per Worker
Country	(Average 1960-2000)	in 2000
Japan	31.1%	\$69,235
New Zealand	21.0%	\$40,176

Question 5:

For each of the following scenarios, use the graphical depiction of the Malthusian model to illustrate what happens to a country's population size and per-capita income in the short-run and in the long-run.

- a) Scientists discover a new strain of wheat that can produce twice as much grain per acre.
- b) A war kills half of the population.
- c) A volcanic eruption kills half the people and destroys half the land.