In this document you find some examples of exercises for the Solow growth model found at http://www.natskolan.se/exercises/growth.htm

Exercises

You should write your answers of the following exercises in a word document. To illustrate your answer you may copy the figures in excel and paste them into the word document.

Note that the scale on the axis adjusts when you change the numbers. When you interpret the figures you cannot just see whether the curves jump up or down but has to take the scale into account.

A)

To start with we will examine the case with no population growth and no technological progress. i. e. both a and n should be equal to zero.

Use the following initial values:
A=1
L=80
K=0,1

And use the depreciation rate = 0,2 and α = 0,3.

In the first period the saving rate should be 0.2 and in the second the saving rate should be 0.5

intitial values		parameters				
A	1	n	0		first	second
L	80	depr	0.2	Saving:	0.2	0.5
K	0.1	a	0	alpha	0.3	

What happens with the capital stock, production and consumption when the share of savings is increased? Explain why.

To get a better understanding of what happens you may look at the sheet “Investments and depreciations”. What happens with the capital stock when investments are higher than depreciations? What happens with the capital stock when they are equal? Why grow depreciations faster than investments so that they become equal?

B)

What is the golden rule level of investments? You are assumed to try different values of the saving rate in order to answer this question. What are the value of consumption per worker, capital stock per worker and production per worker in steady state when you use the “golden rule” saving rate?

Compare the value of capital per worker with the figure in the sheet “textbook figure” Do you get the same value of the steady state capital stock per worker?

C)

Let us introduce population growth into the model. For this exercise you should use the following parameter values.

intitial values		parameters				
A	1	n	0		first	second
L	80	depr	0.2	Saving:	0.2	0.2
K	0.1	a	0	alpha	0.3	

Copy the relevant figures into your word document

Than you should change the population growth from 0 to 1 percent each year i.e n=0.01

intitial values		parameters				
A	1	n	0.01		first	second
L	80	depr	0.2	Saving:	0.2	0.2
K	0.1	a	0	alpha	0.3	

Copy once again the relevant figures into your word document and explain the difference between 0 and 1 percent population growth.

What happens with production and consumption per worker in steady state when population growth is increased? What variables will converge towards a steady state and what variables will continue to growth for ever?
Explain why.

D)
Let us introduce technological progress into the model. You should change the productivity growth from 0 to 2 percent each year i.e a=0.02. For this exercise you should use the following parameter values.

intitial values		parameters				
A	1	n	0.01		first	second
L	80	depr	0.2	Saving:	0.2	0.2
K	0.1	a	0.02	alpha	0.3	

Copy the relevant figures into your word document and explain the difference compared to exercise C.

What variables will converge towards a steady state and what variables will continue to growth forever?
Explain why.

E)

The depreciation rate = 0.2 is unrealistically high. Now we should investigate what happens with a more realistic depreciation rate.

Make first a figure with these parameter values

intitial values		parameters			first	second
A	1	n	0			
L	80	depr	0.2	Saving:	0.2	0.2
K	0.1	a	0	alpha	0.3	

Copy the relevant figures into your word document

Than you should decrease the depreciation rate

intitial values		parameters			first	second
A	1	n	0			
L	80	depr	0.1	Saving:	0.2	0.2
K	0.1	a	0	alpha	0.3	

Copy the relevant figures into your word document and explain the differences.

What impact would the depreciation rate have on the time it takes to adjust to the steady state? What is the impact on the steady state level of the capital stock?

F)

Now we will examine the impact from a one time immigration of labour. We assume now that both population growth and technological progress is zero. The saving rate should be equal to 0.2 in both time periods. Put depreciations once again equal to 0.2.

intitial values		parameters			first	second
A	1	n	0			
L	80	depr	0.2	Saving:	0.2	0.2
K	0.1	a	0	alpha	0.3	

Assume that we get a temporary immigration of 20 workers in period 50. If you type 100 in cell C51 the value of L will be automatically adjusted to 100 for the rest of the time.

Investigate the two figures ”growth paths levels” and ”growth paths per worker”. Explain what is happening.

Would the age of the people that immigrate have any impact on the expected result?
Could that last question be answered from this model?