Assignment 1

Please hand in clearly written answers to the questions including graphs that are clearly labelled and explained. You are also expected to hand in the MATLAB codes used. Use comments (code lines preceded by a %) to explain what you are trying to achieve with each part of the code.

1. Consider a Solow Model with the following production function

$$y = k^{\frac{1}{2}}$$

and where the depreciation rate is 10% ($\delta = 0.1$) and the savings rate is $s = 0.3$.

   (a) Find the steady state for capital, investment, consumption and output. Show it on a graph involving investment and depreciation.

   (b) Using MATLAB, produce a simulation of length $T = 100$ for this economy. That is, starting at $k_0 = 4$, compute the evolution of capital, consumption, investment and output for 100 periods. Plot these on a graph (with time on the horizontal axis) and confirm that these variables indeed converge to the steady state.

   (c) Repeat part b starting from $k_0 = 16$.

   (d) (Calibration) Suppose you know that in a particular country, the ratio of investment to output is on average 0.08 and the ratio of capital to output is on average 2.5. Can you find values of the parameters (s, δ) such that the steady state of this economy delivers these exact ratios?

2. Consider a Solow Model with the following production function

$$y = k^{\frac{1}{2}}$$

and where the depreciation rate is 10% ($\delta = 0.1$).

   (a) Using MATLAB, compute steady state capital, output, consumption and investment for a *large* (>100) number of values for $s \in [0, 1]$. Use these computations to obtain an approximation of the golden rule capital, consumption and savings rate.

   (b) Using MATLAB, plot steady state output versus steady state capital. On the same graph, plot also steady state investment and steady state consumption versus capital.

   (c) Using MATLAB, plot steady state output as a function of the savings rate. On the same graph, plot also steady state investment and steady state consumption versus savings rate.

   (d) Find the Golden Rule level of savings using calculus and compare to the numerical results above.

3. Consider an economy with the following production function

$$y = k^{\alpha}$$

where the depreciation rate is δ and the savings rate is s. Using the Solow model, solve for the Golden Rule level of the savings rate in terms of the parameters of the model.