Application of MATLAB: Logistic Map

The final assignment for Applications of Computing module and is worth 50% of the overall module grade. The coursework is a group assignment and the groups should consist of three of four members. Each group must submit one copy of the work with an assignment briefing sheet clearly stating the members of the group. Submission will be via the assignment area of the StudyNet page for the module

To be able to complete assignment you will need to refer to **Logistic Map information sheet**.

1. You are to design and implement a MATLAB function m-file to model and display the iterations of the Logistic equation in the form of a cobweb diagram. Your function m-file should have the following features:

    (a) The inputs to the function should be

        - effective growth rate (λ)
        - initial iterate value (x_0)
        - number of iterations (n)

    (b) The output from the function m-file should be a subplot containing two plots. The two plots are

        - cobweb diagram of the iterations of the logistic equation
        - time series plot of the iteration values

    [70 Marks]

2. Using symbolic calculations of MATLAB in the command window (or an m-file) to determine examples of the following (experiment with values of λ in the range $3 < \lambda < 4$):

    - a period 2 limit cycle
    - a period 3 limit cycle
    - a period 4 limit cycle

    Can you explain why you get more solutions than you expect? Display each limit cycle and corresponding time series using your function m-file. Investigate and comment on the stability of each limit cycle.

    Note: for this question you should record your calculations in a diary file (and or m-file). The diary file should clearly indicate the values corresponding to each limit cycle and the nature of their stability. The plots generated from your function m-file should be pasted into a Word file. The diary and Word file will need to be submitted as part of the coursework.

    [30 Marks]