Assignment 1

1. The attached pdf file is an excerpt from the following book which provides hands on exercise on AnyLogic. You can down load the original book from: https://www.anylogic.com/resources/books/free-simulation-book-and-modeling-tutorials/

   Follow all the steps outlined in **SEIR** model in the attached pdf file. Complete the exercise. Save the output of each step as print screen in a pdf file. Upload the AnyLogic output file and screen shots in a pdf file.

2. Implement the attached Vensim pedator-prey model in Excel using Euler's method. Draw all the relevant plots including the phase plots. What is the effect time step? Upload the Excel file and screen shots in a pdf file.

3. (a) Implement the attached Vensim "Falling Body.mdl" model in Excel using Euler's method. Draw all the relevant plots including the phase plots.

   (b) Extend the Excel model assuming that the ball keeps bouncing back with 75% of its final dropping velocity. Draw all the relevant plots. Upload the Excel file and screen shots in a pdf file.

4. Implement the attached Vensim model for Production and Inventory in AnyLogic and run an Experimental Simulation of "Parameter Variation" on "Investment Rate" and "Production Capacity" as a result of variation of "SALES SCENARIO" parameter. Display the necessary plots. Upload the AnyLogic output file and screen shots in a pdf file.

5. Implement the following linear competing system in Excel:

$$P_{n+1} = r_1 p_n - s_1 Q_n$$

$$Q_{n+1} = -s_2 p_n + r_2 Q_n$$

where r1, r2, s1, s2 are non-negative parameters, Pn and Qn represent competing agents. Assume r1=1.35, r2 = 0.75, s1= 0.1, s2= 0.05. Explain the results. Also, show the relevant plots. Upload the Excel file and screen shots in a pdf file.