- Mention the **title and axis** for each of the plot. Also show the name of the model used for fitting in the plot. Show the legends if you have multiple plots in a figure.

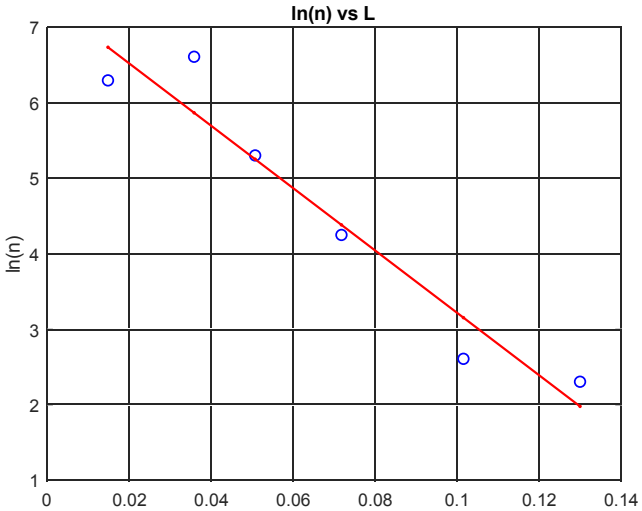
1. **Calculation of population density parameters for crystallization operation. Crystal screening analysis yield the following information**.

13.3 (***Population density parameters from sieve analysis data***)[4] One hundred fifty grams of crystals separated from one litre of suspension from an MSMPR crystallizer is subjected to screen analysis to get the following data:

Tyler mesh	12/14	14/20	20/28	28/35	35/48	below 48 mesh
Mass(g)	28.5	29.2	37.5	27	24.7	3.1

Mesh no./ screen opening(µm) data: 12/1410 µm; 14/1190; 20/841; 28/595; 35/420; 48/297.

The working volume of the crystallizer is 200 litres, and the rate of withdrawal of the slurry is 250 litre per hour. Given ρ_c = 1400 kg/m^3 and volume shape factor ϕ_v = 0.42, determine the crystal growth rate and the zero-size population density of the crystals. What is the rate of nucleation, B^0?



Plot the Population density as a function of length of crystal. Also plot the predicted population density from the model described above.

Hints:
MSI = [1.41 1.19 0.841 0.595 0.42 0.297]; %INITIAL MESH SIZE
MSF = [1.19 0.841 0.595 0.42 0.297 0]; %FINAL MESH SIZE

L = ……; %Average passing mesh size in cm
L_diff = (MSI - MSF) * (10^-1) /2; %delta L in cm
%plotting the L vs ln(n) for raw data
%fitting L vs ln(n) for the given system in straight line.

2. **Drying**: The following values of drying parameters were obtained from the experimental data on batch drying of a granular solid taken on a tray content (in kg moisture per kg solid). Constant drying rate, Nc= 2.5 kg/$m^{2.h;}$ first critical moisture Xc1=0.18., second critical moisture, Xc2=0.1. equilibrium moisture X^{*}=0.

   Give a graphical schematic [typical drying rate curve] showing the constant drying period, first falling drying rate period, second falling drying rate period etc, in the X-N curve in the graph paper. Using the above data and information, calculate the time required to dry the material from an initial moisture of Xi=0.35 to a final moisture of Xf=0.01under the conditions of the experiment.

   Hint: