Overview

This laboratory involves using file input to incorporating data into Mathematica and then perform basic statistical acessments and curve fitting. Students will need to extract subsets of the input data for analysis.

Tasks

Incorporating, Analyzing, and Plotting Data from a File.

In the file located at http://pruffle.mit.edu/3.016-2006/Laboratories/NELSON.DAT you will find data 128 observations of the voltage at which an insulator material failed (i.e., dielectric breakdown, short, big sparks and "zzzzt"). The file has three columns in it.

Hints:

Cases *If* `data` *is* {{*2,1,2*},{*1,2,3*},{*2,2,1*},{*3,1,2*}}, *then* `Cases[data, {2, PatternA_, PatternB_}]` *will return* {{*2,1,2*},{*2,2,1*}}.

Patterns *If* `data` *is* {{*2,1,2*},{*1,2,3*},{*2,2,1*},{*3,1,2*}}, *then* `data/.{a_ , b_ , c_}->{a,b}` *will return* {{*2,1*},{*1,2*},{*2,2*},{*3,1*}}.

Col. 1 The voltage (in kilovolts) at which the insulator failed.

Col. 2 The number of weeks the insulator material was aged at some elevated temperature.

Col. 3 The temperature (in degrees celcius) at which the material was aged.

The objective is to read this data into Mathematica and plot the averages and other information about the data.

1. On a single plot, find an illustration that most usefully shows the average breakdown voltage versus aging time for the different aging temperatures.
2. Create another plot that superimposes the above with the actual data.
3. (Extra Credit (no help given)) Find a fit to the data and plot it with the actual data. Based on your fit, make a prediction of the breakdown voltage for a material aged at 100° C for 2 years.

Save your Work Save your work as a mathematica notebook: `3016_Lastname_Lab04.nb`.

Report

This homework will be graded. Your report on the work above should be ordered as it is above. Your report should include comments that would help one of your classmates understand what your work demonstrates. Send your report as a saved Mathematica notebook with name `3016_Lastname_Lab04.nb` to 3016-labreports@pruffle.mit.edu. As the subject use "3.016 Lab 04 LASTNAME".