MAT 116E Advanced Scientific and Engineering Computing

Lab-10 / CRN : 12852

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1 Question 1

A rectangular piece of cardboard, 40 in. long by 22 in. wide, is used for making a rectangular box by cutting out squares of x by x from the corners and folding up the sides.

a.) Create a polynomial expression for the volume V in terms of x.

b.) Make a plot of V versus x.

c.) Determine x if the volume of the box is 1000 in^3.

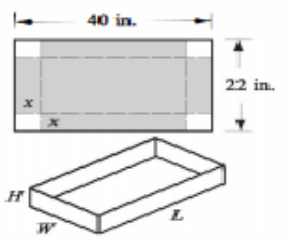

Figure 1: Schematic view of rectangular cardboard

2 Question 2

Data on the vapor pressure P of water as a function of temperature T are given in the following table. Determine whether the data can be described best by a second order polynomial ($y = ax^2 + bx + c$) fit or by an exponential fit ($y = be^{mx}$) by calculating the MAPE(Mean Absolute Percentage Error). Develop a model of the pressure as a function of temperature using the **polyfit** command, and use best fit curve to estimate the pressure at a temperature of $T = 300°K$.

T ($°K$)	273	278	283	288	293	298
P (MPa)	4.579	6.543	9.209	12.788	17.535	23.756

Let A_j be actual values, P_j be the estimated values and n be the number of data points, then MAPE is calculated as follows:

$$MAPE = \frac{100}{n} \sum_{j=1}^{n} \frac{|A_j - P_j|}{|A_j|}$$