Homework 4 Function Optimization

1. Find the (local/global) maxima/minima of the following functions on the prescribed interval.
   
a. \( f(x) = x^3 + 2x^2 + 5 \) \(-1 \leq x \leq 1\)
   
b. \( f(x) = 2\sqrt{x^2 + 4} + 4 - x \) \(0 \leq x \leq 2\)

2. Find the model parameters (find all the unknowns) that best fit the data in `xydata1.dat`. Plot the data points on top of the best fit curve (first column represents the x-coordinates and the second column represents the y-coordinates of the data).

3. Find the model parameters (find all the unknowns) that best fit the data in `xydata2.dat`. Plot the data points on top of the best fit curve (first column represents the x-coordinates and the second column represents the y-coordinates of the data).

4. Maximizing a circuit output for given input conditions. Find the resistance \( R_2 \) that maximizes the power going through the resistor \( R_2 \). Here \( V_{in}=5V, R_1=10; R_3=5; \)

   Using circuit analysis, the power \( P(R_2) = \frac{V^2}{R_2} \) where \( V = \frac{5R_2}{15R_2 + 50} \)