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**Problem1\_writeup.**

**(1) Estimated Functions:**

= 29.0587x + 92.7676

= -2.1111x2 + 28.5066x + 112.3148

= 1.7574x3 + -1.4324x2 + -0.3307x + 101.8661

= -0.0151x4 + 1.7541x3 + -1.0821x2 + -0.2558x + 100.9145

= -0.00045x5 + -0.0154x4 + 1.7668x3 + -1.0743x2 + -0.3227x + 100.8875

**(2) Data Visualization:**

**Chart, line chart

Description automatically generated**

**(3) What degree polynomial does the relationship seem to follow? Please explain your answer.**

The data seems to best follow a third order polynomial (i.e., a cubic) which can be seen from the   
low error between the estimated regression function, , and the data in the plot above. Degree 4 and degree 5 polynomials show a very similar plot but become no more accurate than the degree 3 polynomial, making the degree 3 polynomial the best option to reduce complexity.

**(4) If we measured a new data point, what would be the predicted value of , based on the polynomial identified as the best fit in Question (3)?**

If we measured a new data point, x=3, the corresponding predicted value would be, = 135.43283

**Problem2\_writeup.**

**(1) Plot the mean squared error as a function of lambda in Ridge Regression:**

Chart, line chart

Description automatically generated

**(2) Find best lambda:**

Based on the range of Lambda values tested, the best lambda value is , which yields an MSE of as shown on the plot above.

**(3) Find equation of the best fitted model:**

**(4) Draw a prediction plot using Google data**

Chart

Description automatically generated