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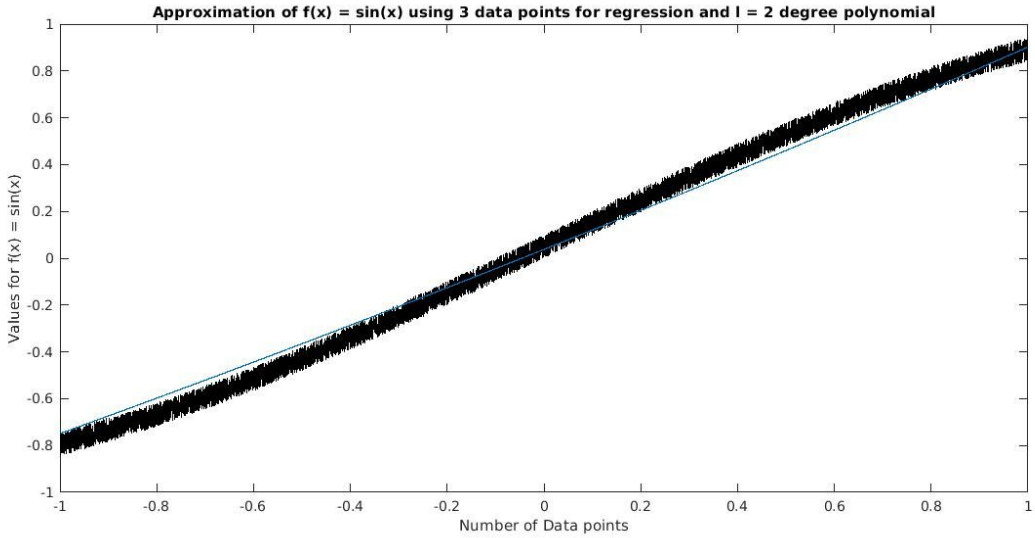
April 15, 2019
CS 3200

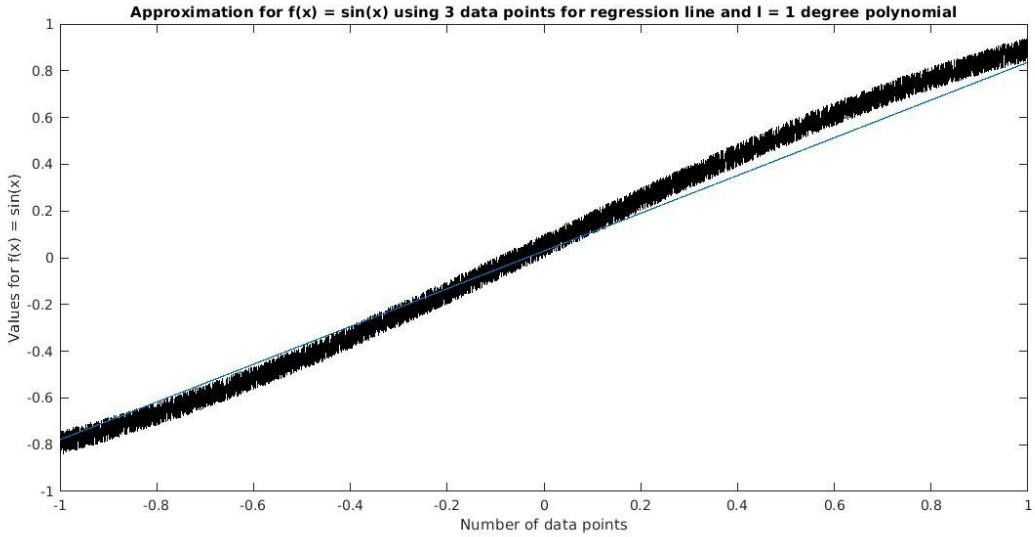
QR Decomposition Analysis

Note to Grader:
To change the ND values as specified for part c, go to line 8 to make the changes
To change the l values as specified for part c, go to line 11.
c) Nd = 3 Graphs

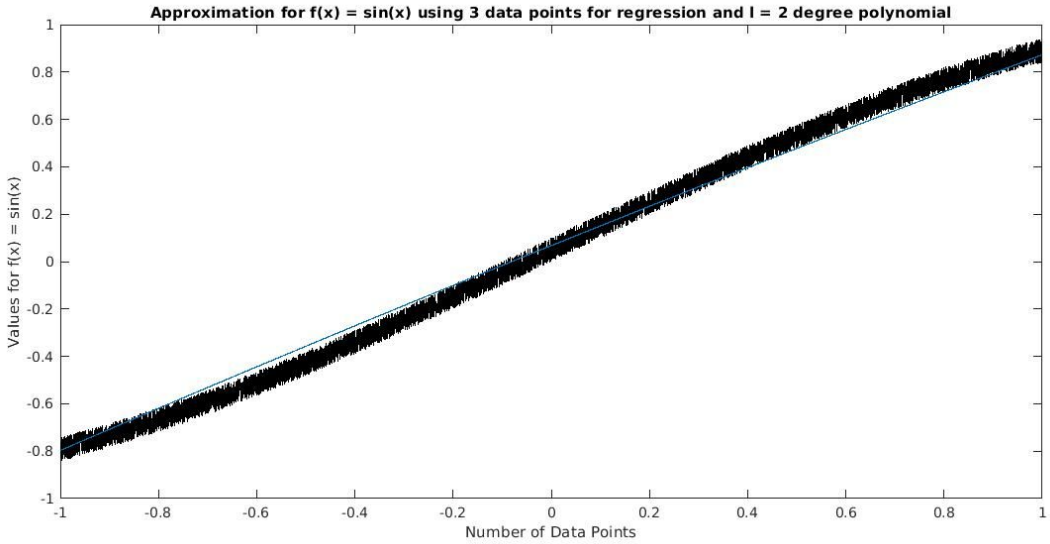
L = Nd - 1



L = 1

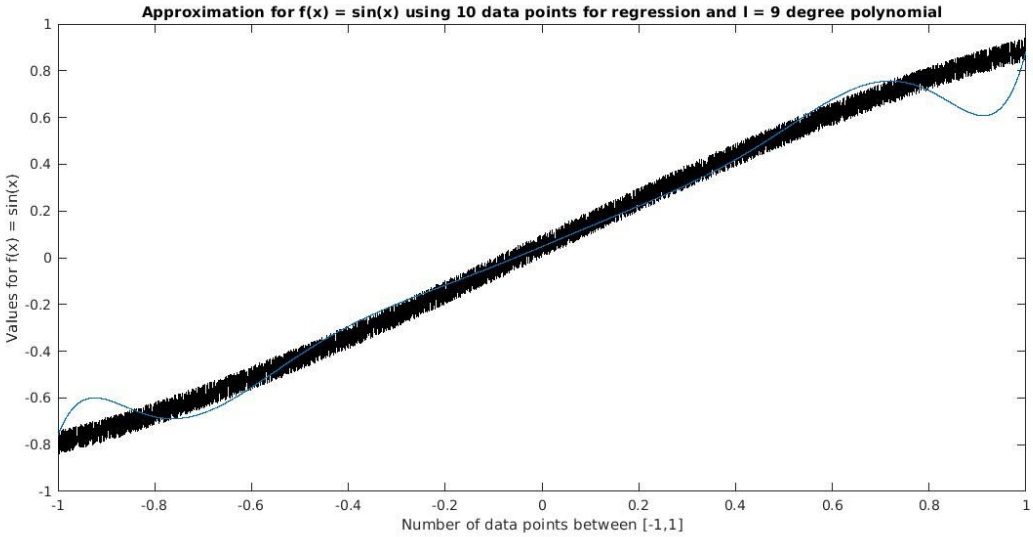


L = 2

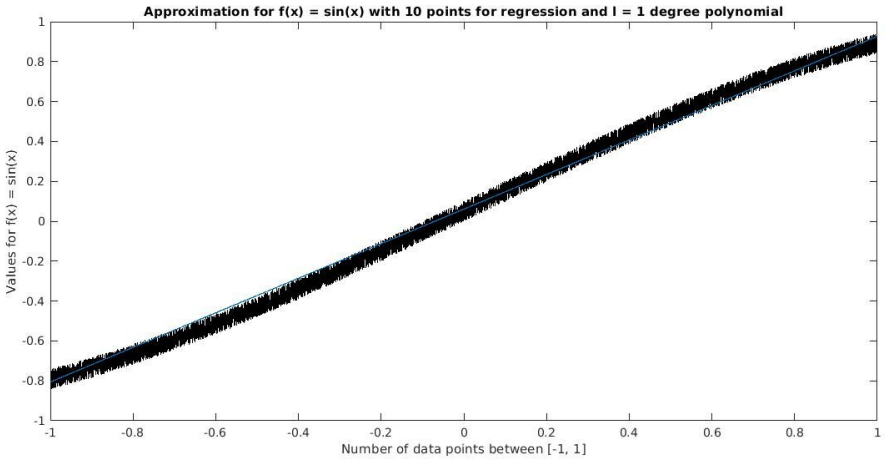

Approximation for f(x) = sin(x) using 3 data points for regression and l = 2 degree polynomial
Values for f(x) = sin(x)
Number of Data Points

Nd = 10

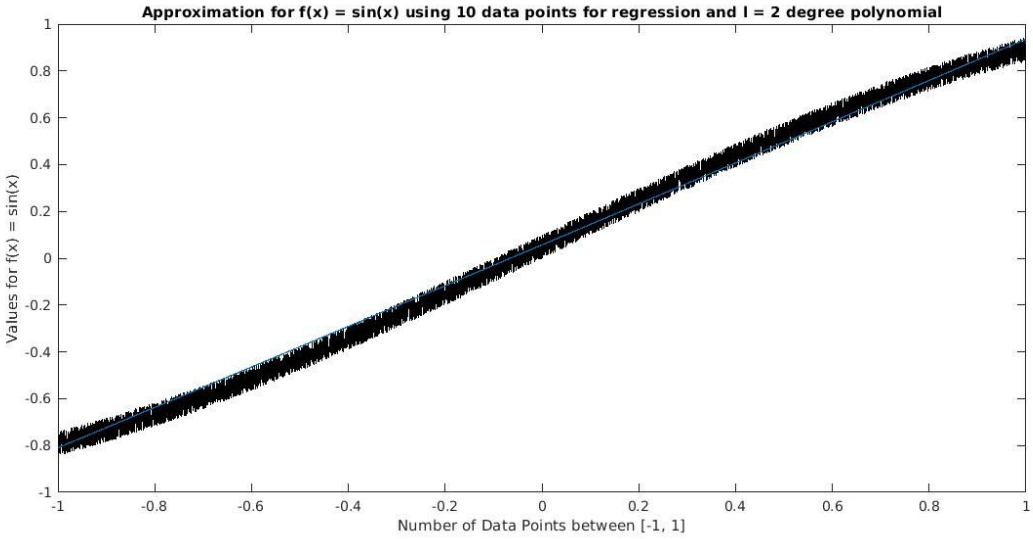
L = Nd - 1


Approximation for f(x) = sin(x) using 10 data points for regression and l = 9 degree polynomial
Values for f(x) = sin(x)
Number of data points between [-1,1]

L = 1

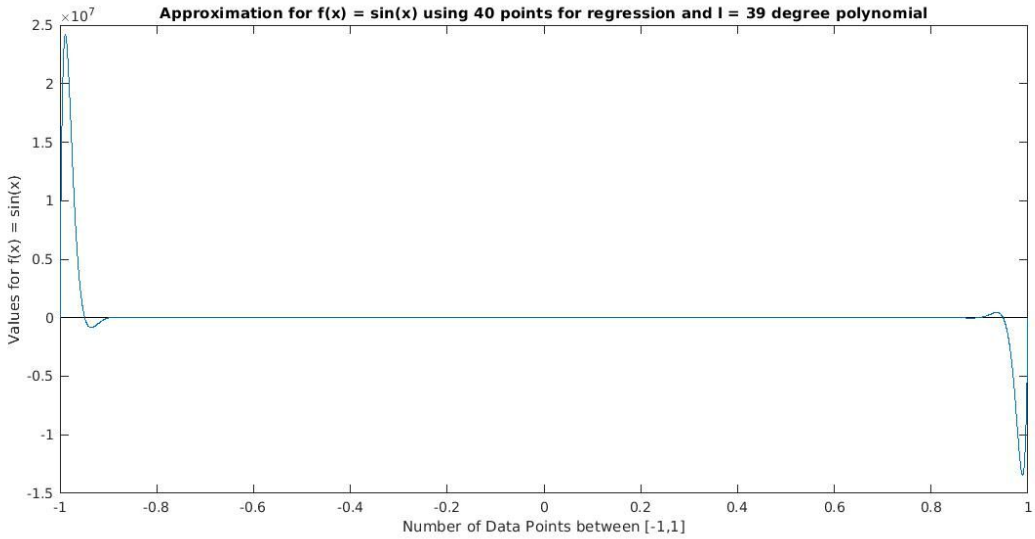


L = 2

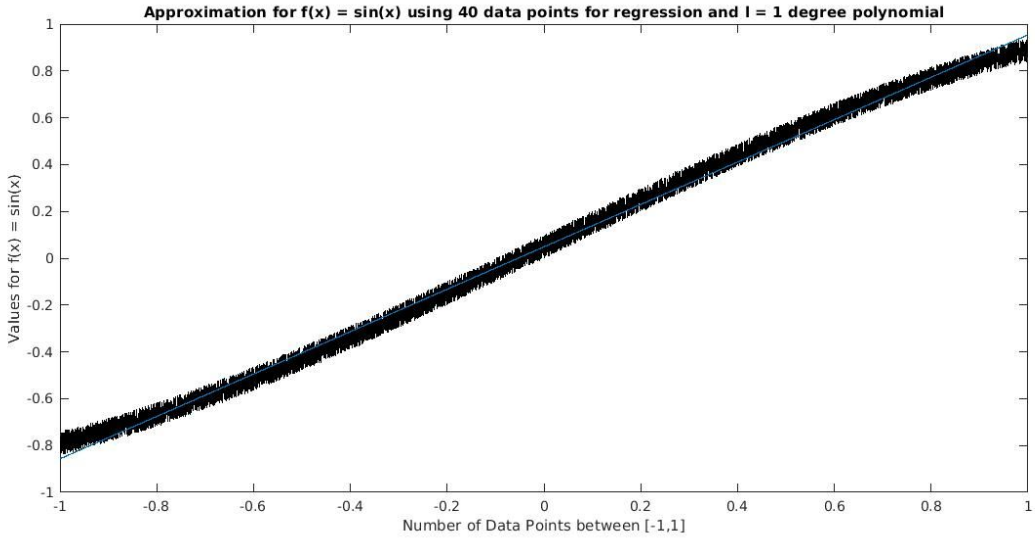


Nd = 40

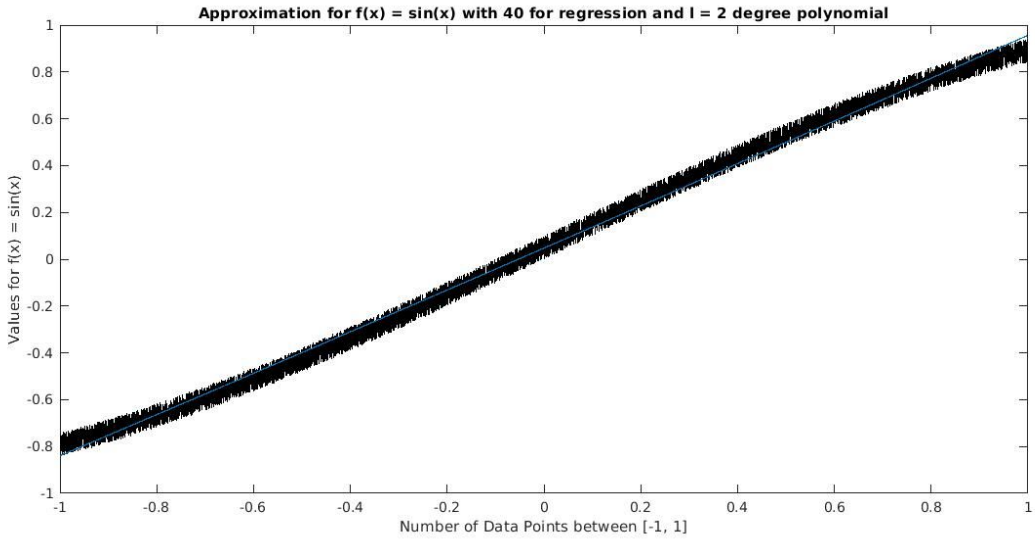
L = Nd - 1


Approximation for f(x) = sin(x) using 40 points for regression and l = 39 degree polynomial
×10^7
Values for f(x) = sin(x)
Number of Data Points between [-1,1]

L = 1


Approximation for f(x) = sin(x) using 40 data points for regression and l = 1 degree polynomial
Values for f(x) = sin(x)
Number of Data Points between [-1,1]

L = 2



Looking at the graphs, when the number of regression points are small, the l values don't really affect the quality of the fit as seen with the first set of graphs when Nd = 3. When we cranked the number of points to 10 points, the polynomial degree of l doesn't approximate the function well for when l = Nd - 1 because of the upper and lower parts of the curves for . When l is a low value that is smaller than Nd when Nd is large, then the regression curve accurately approximates the function as shown with the case when Nd = 40.

d) We should measure the relative error using the function sin(x) because it is the actual function and we can can compare actual values with the function that we are approximating. If you use the function f(x) then the relative error includes the actual function plus noise which affects the error for the entire trend line. If you use the sin(x) equation then you are finding the error for the regression line because the noise has been removed.