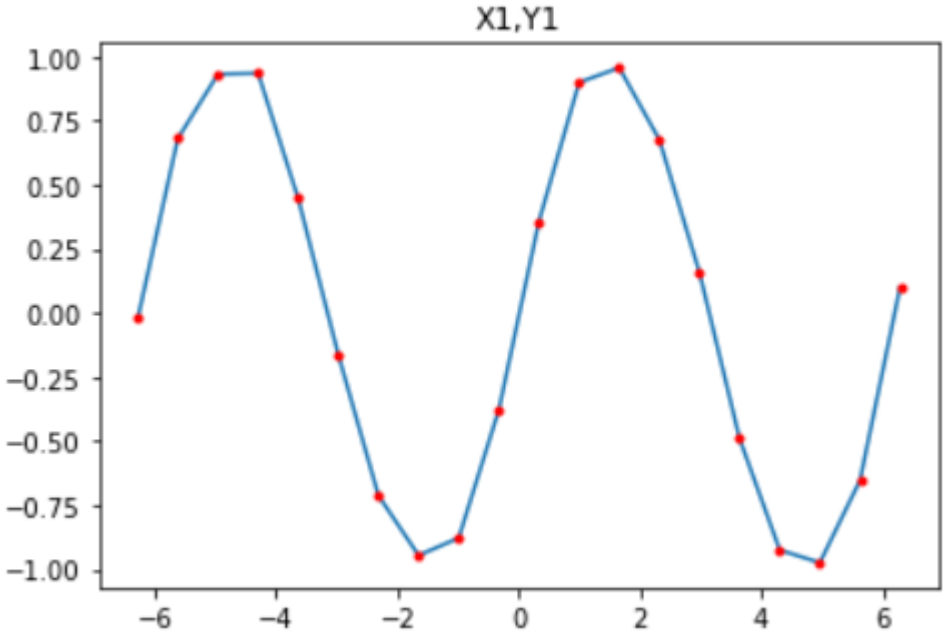
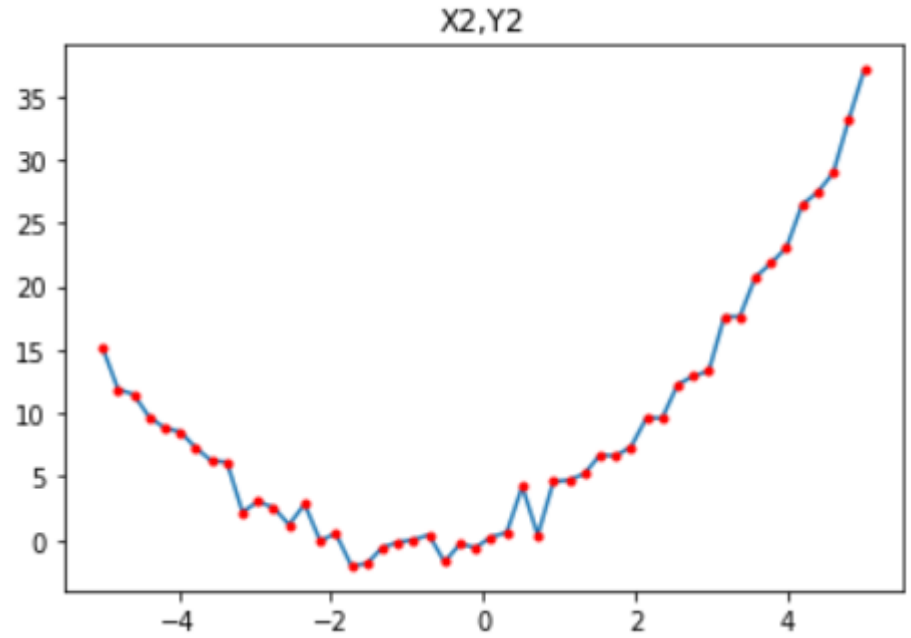
1. Part a).

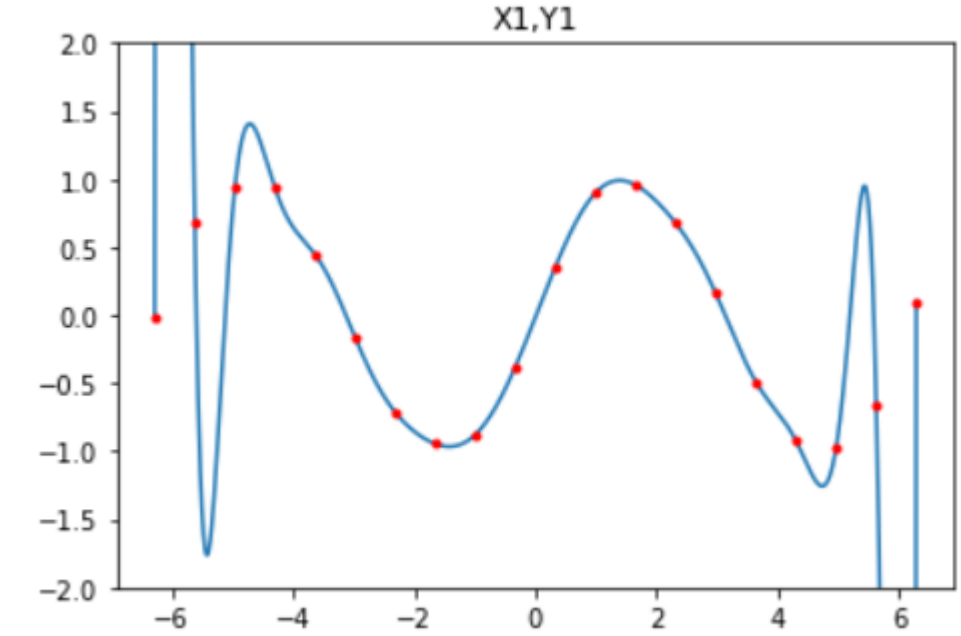


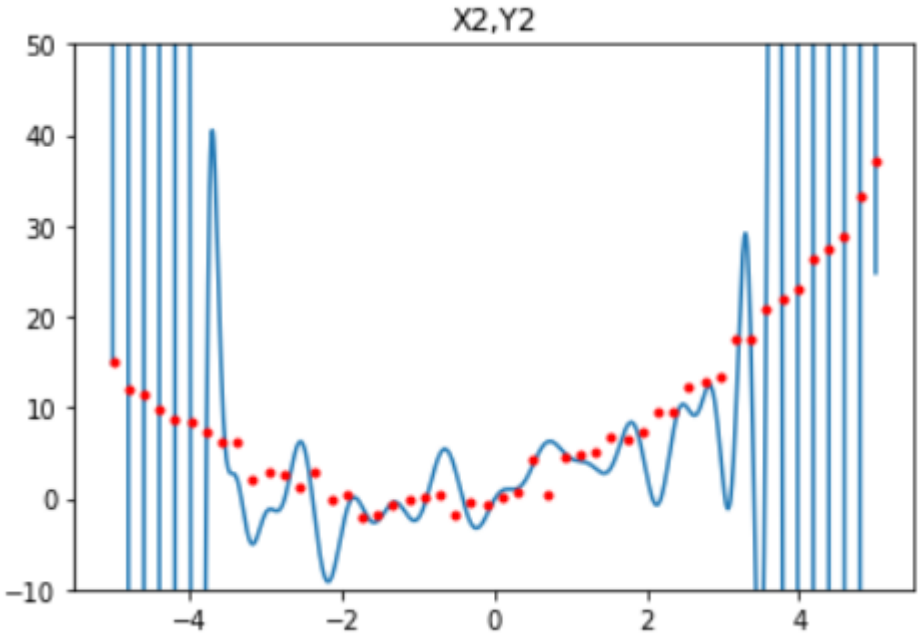


For data set 1 (X1, Y1), interpolation is a good approach. Because the data in data set 1 plot is relatively smooth, interpolation approach can go through each data. Also the size of this data set is not large.

For data set 2 (X2, Y2), interpolation is not a good approach. The size of data set is too large, and may not deal with possible noisy data. For this data set, I will prefer to use least squares.

Part b).

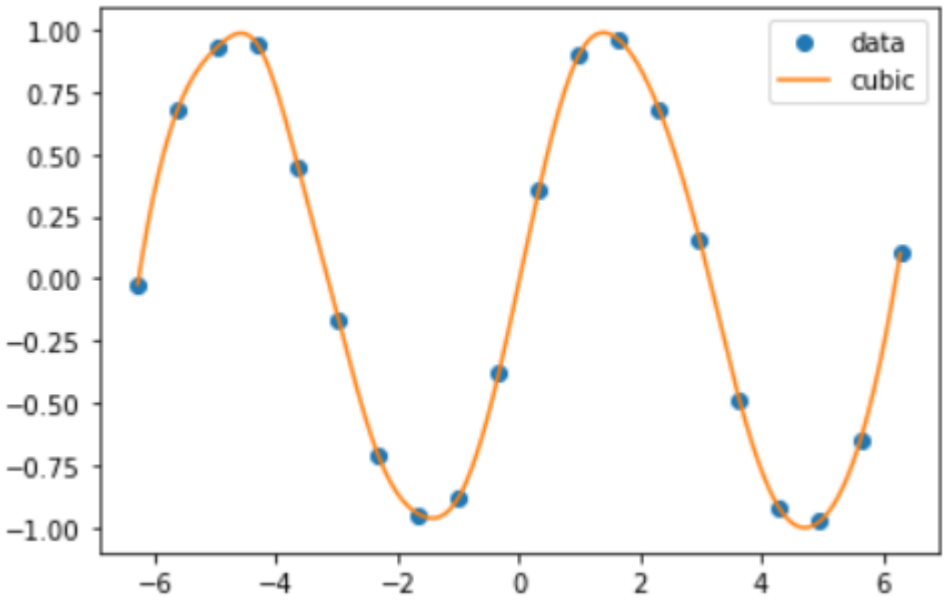




For data set1, the plot looks kind of smooth, but not stable. Polynomial interpolation with Vandermonde's matrix can not solve the noisy data well.

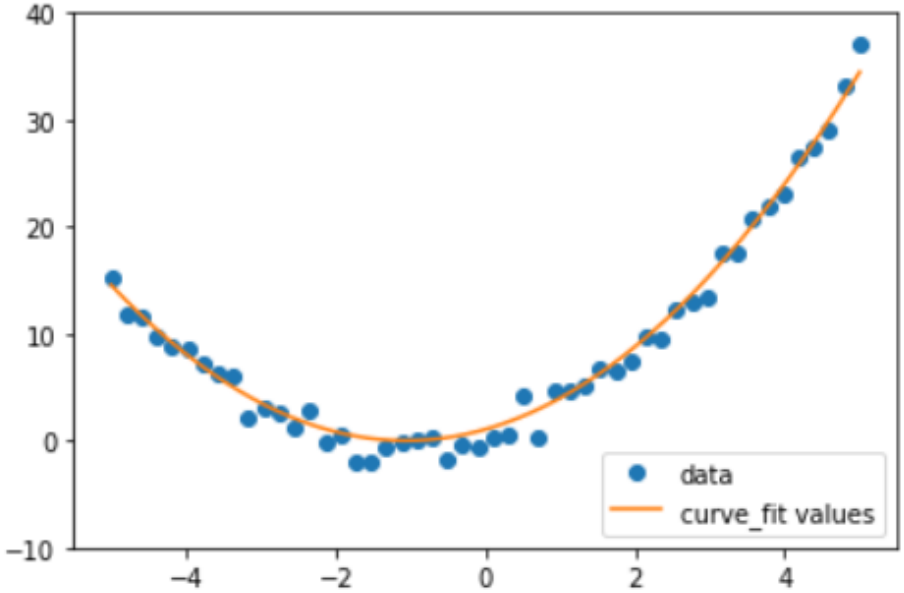
For data set 2, the plot looks really unstable. Because of the large data set, the polynomial of data set is too noisy.

Part c).



Compare with part b) for data set 1, the cubic spline plot is more stable and smooth. Because cubic spline yields similar results, even when using low degree polynomials, while avoiding Runge's phenomenon for higher degrees.

Part d).



Compare with part b) for data set 2, the fit plot is stable and smooth. Because using least square approximate here works on overdetermined system and noisy data.