CS 6464 - CSLT
SOFTWARE ASSIGNMENT 1

Task 1: Regression - Polynomial Fitting:

Consider the problem of fitting one-dimensional data with a polynomial. Write an R code to plot function y given in "Q1_fun_xx".

Randomly extract 100 points from the function and add normally distributed noise to the data points from sigma value range to get "noisy data", $\hat{y}$.

1. Fit polynomial of degree **"d"** (values given in Table 1 below) to the noisy data.
2. Compute the bias and variance for the models fitted.
3. Plot the bias-variance against model complexity.
4. Plot the bias and variance as a function of sigma (for plotting bias and variance against sigma, pick a value of sigma in 10 equal intervals in the range as given in the table below and add it to all the 100 data points and get the corresponding bias and variance values).

Functions: (Code for both functions for -10 <= x <= 10)

Q1_fun_01: y= $0.3\ cos(3\pi x)\ -\ 0.4\ cos(4\pi x)\ -10/(x^2\ +\ 1)$

Q1_fun_02: y= $0.4\ log\ (x^4\ +\ log(x-0.7)+e^{3x})$

Table 1:

S. No.	Roll Nos.	d values	Sigma values
1	CH17D406	1, 10, 25	0.5 - 1.5
2	CS16B044	2, 11, 24	1-2
3	CS18M016	3, 12, 23	0.2-1.2
4	CS18S038	4, 14, 26	1.5-2.5
5	CS18S040	5, 17, 28	0.1-1.1

6	CS19D002	1, 11, 21	0.9-1.9
7	CS19M010	2, 12, 28	1.1-2.1
8	CS19M011	3, 10, 24	0.3-1.3
9	CS19M016	4, 13, 22	0.8-1.8
10	CS19M017	5, 16, 27	1.2-2.2
11	CS19M020	1, 12, 23	0-1
12	CS19M023	2, 13, 26	0.4-1.4
13	CS19M024	3, 11, 25	0.7-1.7
14	CS19M028	4, 10, 21	1.3-2.3
15	CS19M029	5, 15, 26	0.6-1.6
16	CS19M030	1, 13, 22	0.3-1.3
17	CS19M031	2, 14, 22	1.4-2.4
18	CS19M033	3, 17, 26	0.7-1.7
19	CS19M036	4, 11, 23	0-1
20	CS19M038	5, 14, 25	0.4-1.4
21	CS19M039	1, 14, 24	0.8-1.8
22	CS19M042	2, 15, 21	1.5-2.5
23	CS19M044	3, 14, 27	1-2
24	CS19M045	4, 12, 28	0.9-1.9
25	CS19M047	5, 13, 24	0.6-1.6
26	CS19M048	1, 15, 26	1.2-2.2
27	CS19M049	2, 10, 23	0.5-1.5
28	CS19M050	3, 16, 28	1-2

29	CS19M051	4, 15, 24	1.5-2.5
30	CS19M052	5, 12, 23	0.4-1.4
31	CS19M055	1, 16, 28	1.1-2.1
32	CS19M060	2, 17, 25	0-1
33	CS19M061	3, 15, 21	0.5-1.5
34	CS19M062	4, 16, 25	1.2-2.2
35	CS19M064	5, 11, 22	0.3-1.3
36	CS19M066	1, 17, 27	1.3-2.3
37	CS19M067	2, 16, 27	0.2-1.2
38	ED18B001	3, 13, 22	0.8-1.8
39	ED18B032	4, 17, 27	1.4-2.4
40	ME19S016	5, 10, 21	0.1-1.1
41	CS15B017	1, 12, 19	0.7 - 1.7