Sardar Patel Institute of Technology
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India
(Autonomous College Affiliated to University of Mumbai)

Experiment No.	0
Aim	To implement the various functions e.g. linear, non-linear, quadratic, exponential etc.
Name	Harsh Mukesh Jain
UID No.	20213000048
Class & Division	SE Comps A
Date of Performance	30-01-2023
Date of Submission	4-02-2023

Theory/Experiment:

Nature of graph of the given function

1. **n**

   A line can be thought of as a **function**, which means that if a value of x is given, the equation of the line produces exactly one value of y.
   It is observed that the function f(n) is linear.

2. **ln(ln(n))**

   It is observed that the value of ln(ln(n)) is negative i.e below line y = 0 for value of x upto 1 and at x = 2 the function value is 0 and is increasing for other value's of x.

3. **ln(n)**

It is observed that the value of ln(n) is negative i.e below line y = 0 for value of x less than 1 and at x = 1 the function value is 0 and is increasing for other value's of x.

4. √ ln(n)

It is observed that the value of f(√ ln(n)) is not define for value of x less than 1 and at x = 1 the function value is 0 and is increasing for other value's of x.

5. $(ln(n))^2$

It is observed that the value of f($(ln(n))^2$) is 0 at x = 1 and is increasing for other value's of x.

6. (2) ^ $ln_2(n)$

The value of this function is equal to n whose nature of graph will be linear.

7. (n * ln(n))

It is observed that the value of f(n * ln(n)) is negative and not linear for value of x less than 1 and at x = 1 the function value is 0 and is increasing for other value's of x.

8. (n^1/lg(n))

The value of this function f(n^1/lg(n)) is constant i.e 2 for every value of x.

9. (root(2)^ln(n))

The value of this function f(root(2)^ln(n)) is equal to the value of root(n) and the graph is increasing but not linear.

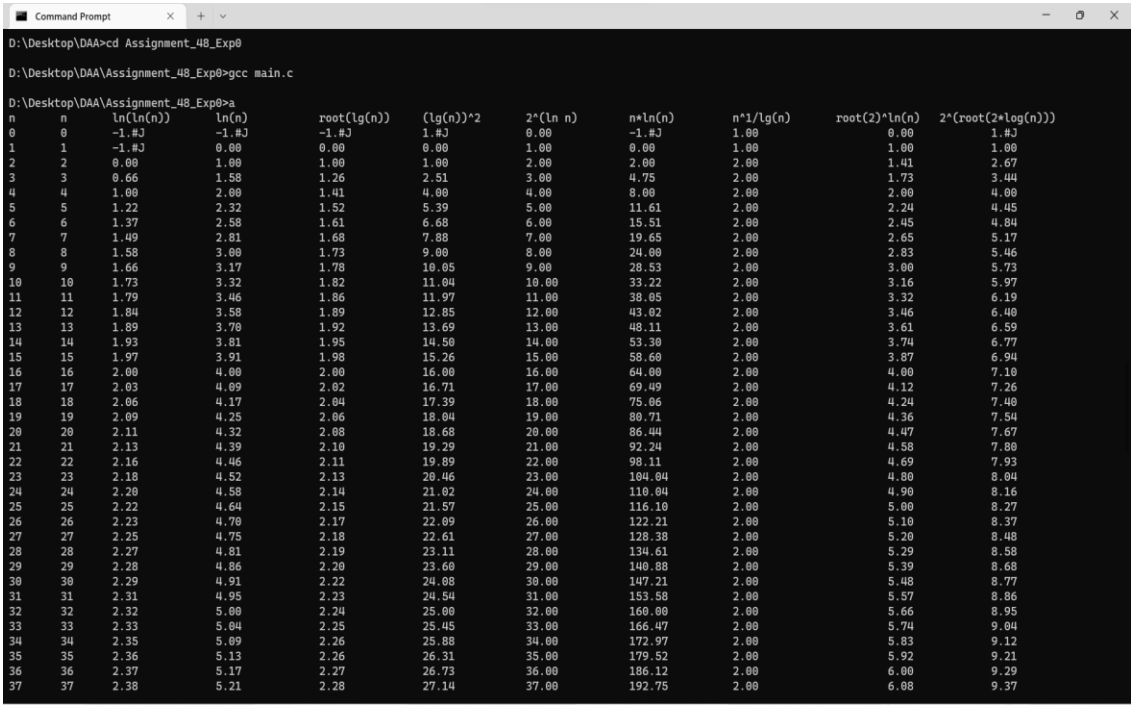
10. (2^(root(2*log(n)))

It is observed that the value of f(2^(root(2*log(n))) is not defined for value of x less than 1 , at x = 1 the value of this function is 1 and is increasing on increasing the value of x.

11. (n!)

The value of n! is 1 for n = 0 and n = 1 and increasing exponentially on increasing the value of n.

OBSERVATION:-



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Command Prompt

D:\Desktop\DAA>cd Assignment_48_Exp0

D:\Desktop\DAA\Assignment_48_Exp0>gcc main.c

D:\Desktop\DAA\Assignment_48_Exp0>a
n       n       ln(ln(n))       ln(n)           root(lg(n))     (lg(n))^2       2^(ln n)        n*ln(n)         n^1/lg(n)       root(2)^ln(n)   2^(root(2*log(n)))
0       0       -1.#J           -1.#J           -1.#J           1.#J            0.00            -1.#J           1.00            0.00            1.#J
1       1       -1.#J           0.00            0.00            0.00            1.00            0.00            1.00            1.00            1.00
2       2       0.00            1.00            1.00            1.00            2.00            2.00            2.00            1.41            2.67
3       3       0.66            1.58            1.26            2.51            3.00            4.75            2.00            1.73            3.44
4       4       1.00            2.00            1.41            4.00            4.00            8.00            2.00            2.00            4.00
5       5       1.22            2.32            1.52            5.39            5.00            11.61           2.00            2.24            4.45
6       6       1.37            2.58            1.61            6.68            6.00            15.51           2.00            2.45            4.84
7       7       1.49            2.81            1.68            7.88            7.00            19.65           2.00            2.65            5.17
8       8       1.58            3.00            1.73            9.00            8.00            24.00           2.00            2.83            5.46
9       9       1.66            3.17            1.78            10.05           9.00            28.53           2.00            3.00            5.73
10      10      1.73            3.32            1.82            11.04           10.00           33.22           2.00            3.16            5.97
11      11      1.79            3.46            1.86            11.97           11.00           38.05           2.00            3.32            6.19
12      12      1.84            3.58            1.89            12.85           12.00           43.02           2.00            3.46            6.40
13      13      1.89            3.70            1.92            13.69           13.00           48.11           2.00            3.61            6.59
14      14      1.93            3.81            1.95            14.50           14.00           53.30           2.00            3.74            6.77
15      15      1.97            3.91            1.98            15.26           15.00           58.60           2.00            3.87            6.94
16      16      2.00            4.00            2.00            16.00           16.00           64.00           2.00            4.00            7.10
17      17      2.03            4.09            2.02            16.71           17.00           69.49           2.00            4.12            7.26
18      18      2.06            4.17            2.04            17.39           18.00           75.06           2.00            4.24            7.40
19      19      2.09            4.25            2.06            18.04           19.00           80.71           2.00            4.36            7.54
20      20      2.11            4.32            2.08            18.68           20.00           86.44           2.00            4.47            7.67
21      21      2.13            4.39            2.10            19.29           21.00           92.24           2.00            4.58            7.80
22      22      2.16            4.46            2.11            19.89           22.00           98.11           2.00            4.69            7.93
23      23      2.18            4.52            2.13            20.46           23.00           104.04          2.00            4.80            8.04
24      24      2.20            4.58            2.14            21.02           24.00           110.04          2.00            4.90            8.16
25      25      2.22            4.64            2.15            21.57           25.00           116.10          2.00            5.00            8.27
26      26      2.23            4.70            2.17            22.09           26.00           122.21          2.00            5.10            8.37
27      27      2.25            4.75            2.18            22.61           27.00           128.38          2.00            5.20            8.48
28      28      2.27            4.81            2.19            23.11           28.00           134.61          2.00            5.29            8.58
29      29      2.28            4.86            2.20            23.60           29.00           140.88          2.00            5.39            8.68
30      30      2.29            4.91            2.22            24.08           30.00           147.21          2.00            5.48            8.77
31      31      2.31            4.95            2.23            24.54           31.00           153.58          2.00            5.57            8.86
32      32      2.32            5.00            2.24            25.00           32.00           160.00          2.00            5.66            8.95
33      33      2.33            5.04            2.25            25.45           33.00           166.47          2.00            5.74            9.04
34      34      2.35            5.09            2.26            25.88           34.00           172.97          2.00            5.83            9.12
35      35      2.36            5.13            2.26            26.31           35.00           179.52          2.00            5.92            9.21
36      36      2.37            5.17            2.27            26.73           36.00           186.12          2.00            6.00            9.29
37      37      2.38            5.21            2.28            27.14           37.00           192.75          2.00            6.08            9.37
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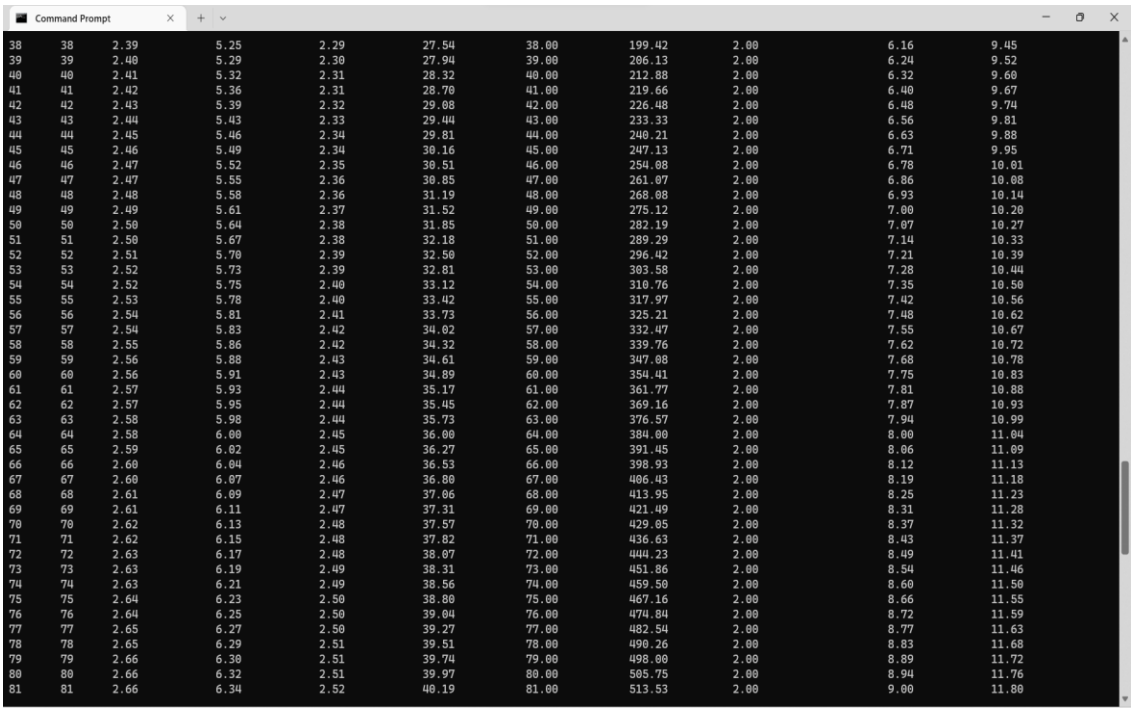

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Command Prompt

38      38      2.39            5.25            2.29            27.54           38.00           199.42          2.00            6.16            9.45
39      39      2.40            5.29            2.30            27.94           39.00           206.13          2.00            6.24            9.52
40      40      2.41            5.32            2.31            28.32           40.00           212.88          2.00            6.32            9.60
41      41      2.42            5.36            2.31            28.70           41.00           219.66          2.00            6.40            9.67
42      42      2.43            5.39            2.32            29.08           42.00           226.48          2.00            6.48            9.74
43      43      2.44            5.43            2.33            29.44           43.00           233.33          2.00            6.56            9.81
44      44      2.45            5.46            2.34            29.81           44.00           240.21          2.00            6.63            9.88
45      45      2.46            5.49            2.34            30.16           45.00           247.13          2.00            6.71            9.95
46      46      2.47            5.52            2.35            30.51           46.00           254.08          2.00            6.78            10.01
47      47      2.47            5.55            2.36            30.85           47.00           261.07          2.00            6.86            10.08
48      48      2.48            5.58            2.36            31.19           48.00           268.08          2.00            6.93            10.14
49      49      2.49            5.61            2.37            31.52           49.00           275.12          2.00            7.00            10.20
50      50      2.50            5.64            2.38            31.85           50.00           282.19          2.00            7.07            10.27
51      51      2.50            5.67            2.38            32.18           51.00           289.29          2.00            7.14            10.33
52      52      2.51            5.70            2.39            32.50           52.00           296.42          2.00            7.21            10.39
53      53      2.52            5.73            2.39            32.81           53.00           303.58          2.00            7.28            10.44
54      54      2.52            5.75            2.40            33.12           54.00           310.76          2.00            7.35            10.50
55      55      2.53            5.78            2.40            33.42           55.00           317.97          2.00            7.42            10.56
56      56      2.54            5.81            2.41            33.73           56.00           325.21          2.00            7.48            10.62
57      57      2.54            5.83            2.42            34.02           57.00           332.47          2.00            7.55            10.67
58      58      2.55            5.86            2.42            34.32           58.00           339.76          2.00            7.62            10.72
59      59      2.56            5.88            2.43            34.61           59.00           347.08          2.00            7.68            10.78
60      60      2.56            5.91            2.43            34.89           60.00           354.41          2.00            7.75            10.83
61      61      2.57            5.93            2.44            35.17           61.00           361.77          2.00            7.81            10.88
62      62      2.57            5.95            2.44            35.45           62.00           369.16          2.00            7.87            10.93
63      63      2.58            5.98            2.44            35.73           63.00           376.57          2.00            7.94            10.99
64      64      2.58            6.00            2.45            36.00           64.00           384.00          2.00            8.00            11.04
65      65      2.59            6.02            2.45            36.27           65.00           391.45          2.00            8.06            11.09
66      66      2.60            6.04            2.46            36.53           66.00           398.93          2.00            8.12            11.13
67      67      2.60            6.07            2.46            36.80           67.00           406.43          2.00            8.19            11.18
68      68      2.61            6.09            2.47            37.06           68.00           413.95          2.00            8.25            11.23
69      69      2.61            6.11            2.47            37.31           69.00           421.49          2.00            8.31            11.28
70      70      2.62            6.13            2.48            37.57           70.00           429.05          2.00            8.37            11.32
71      71      2.62            6.15            2.48            37.82           71.00           436.63          2.00            8.43            11.37
72      72      2.63            6.17            2.48            38.07           72.00           444.23          2.00            8.49            11.41
73      73      2.63            6.19            2.49            38.31           73.00           451.86          2.00            8.54            11.46
74      74      2.63            6.21            2.49            38.56           74.00           459.50          2.00            8.60            11.50
75      75      2.64            6.23            2.50            38.80           75.00           467.16          2.00            8.66            11.55
76      76      2.64            6.25            2.50            39.04           76.00           474.84          2.00            8.72            11.59
77      77      2.65            6.27            2.50            39.27           77.00           482.54          2.00            8.77            11.63
78      78      2.65            6.29            2.51            39.51           78.00           490.26          2.00            8.83            11.68
79      79      2.66            6.30            2.51            39.74           79.00           498.00          2.00            8.89            11.72
80      80      2.66            6.32            2.51            39.97           80.00           505.75          2.00            8.94            11.76
81      81      2.66            6.34            2.52            40.19           81.00           513.53          2.00            9.00            11.80
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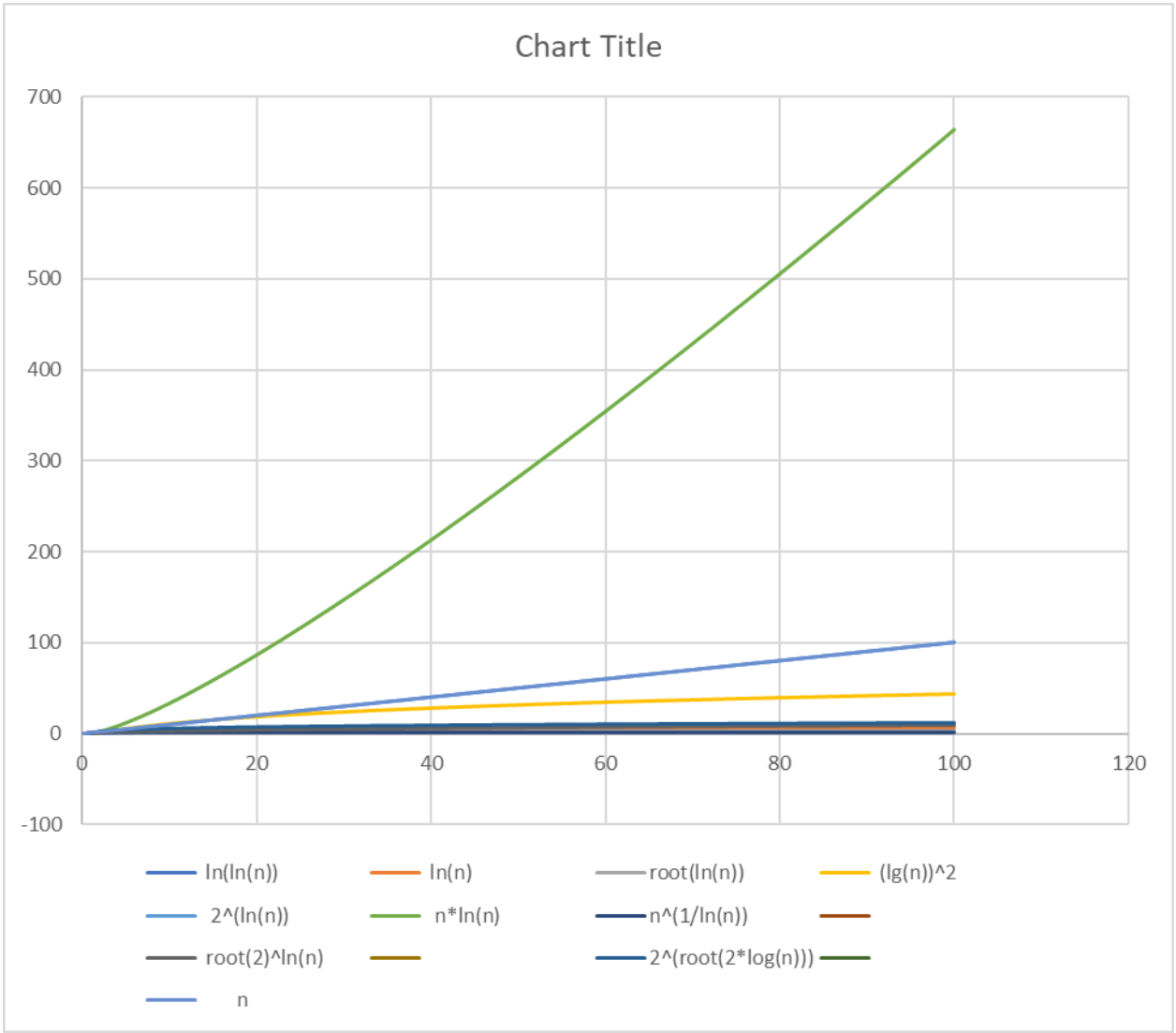
Command Prompt

81	81	2.66	6.34	2.52	40.19	81.00	513.53	2.00	9.00	11.80
82	82	2.67	6.36	2.52	40.42	82.00	521.32	2.00	9.06	11.84
83	83	2.67	6.38	2.52	40.64	83.00	529.13	2.00	9.11	11.88
84	84	2.68	6.39	2.53	40.86	84.00	536.95	2.00	9.17	11.92
85	85	2.68	6.41	2.53	41.08	85.00	544.80	2.00	9.22	11.96
86	86	2.68	6.43	2.54	41.30	86.00	552.66	2.00	9.27	12.00
87	87	2.69	6.44	2.54	41.51	87.00	560.54	2.00	9.33	12.04
88	88	2.69	6.46	2.54	41.72	88.00	568.43	2.00	9.38	12.08
89	89	2.70	6.48	2.54	41.94	89.00	576.34	2.00	9.43	12.12
90	90	2.70	6.49	2.55	42.14	90.00	584.27	2.00	9.49	12.15
91	91	2.70	6.51	2.55	42.35	91.00	592.21	2.00	9.54	12.19
92	92	2.71	6.52	2.55	42.56	92.00	600.17	2.00	9.59	12.23
93	93	2.71	6.54	2.56	42.76	93.00	608.14	2.00	9.64	12.26
94	94	2.71	6.55	2.56	42.96	94.00	616.13	2.00	9.70	12.30
95	95	2.72	6.57	2.56	43.16	95.00	624.14	2.00	9.75	12.34
96	96	2.72	6.58	2.57	43.36	96.00	632.16	2.00	9.80	12.37
97	97	2.72	6.60	2.57	43.56	97.00	640.19	2.00	9.85	12.41
98	98	2.73	6.61	2.57	43.75	98.00	648.24	2.00	9.90	12.44
99	99	2.73	6.63	2.57	43.95	99.00	656.31	2.00	9.95	12.48
100	100	2.73	6.64	2.58	44.14	100.00	664.39	2.00	10.00	12.51



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n       n       ln(ln(n))       ln(n)           root(lg(n))     (lg(n))^2       2^(ln n)        n*ln(n)         n^(ln(ln(n)))   root(2)^ln(n)  2^(root(2*log(n)))
1       -1.#J           0.00            0.00            0.00            1.00            0.00            1.00            1.00            1.00
2       0.00            1.00            1.00            1.00            2.00            2.00            2.00            1.41            2.67
3       1.37            2.58            1.61            6.68            6.00            15.51           2.00            2.45            4.84
4       2.20            4.58            2.14            21.02           24.00           110.04          2.00            4.90            8.16
5       2.79            6.91            2.63            47.71           120.00          828.83          2.00            10.95           13.15
6       3.25            9.49            3.08            90.10           720.00          6834.13         2.00            26.83           20.49
7       3.62            12.30           3.51            151.27          5040.00         61988.01                2.00            70.99           31.12
8       3.94            15.30           3.91            234.07          40320.00                616864.07               2.00            200.80 46.26
9       4.21            18.47           4.30            341.11          362880.00               6702078.99              2.00            602.40 67.54
10      4.45            21.79           4.67            474.85          3628800.00              79075402.57             2.00            1904.9497.12
11      4.66            25.25           5.02            637.59          39916800.00             1007918868.34           2.00            6317.97137.80
12      4.85            28.84           5.37            831.48          479001600.00            13812229193.85          2.00            21886.1193.22
13      5.02            32.54           5.70            1058.58         6227020800.00           2026016946l4.07         2.00            78911.4268.12
14      5.18            36.34           6.03            1320.83         87178291200.00          3168342420693.83                2.00            295259.70               368.53
15      5.33            40.25           6.34            1620.07         1307674368000.00                52634077000864.98               2.00    1143535.91              582.23
16      5.47            44.25           6.65            1958.07         20922789888000.02               925836391565839.75              2.00    4574143.62              679.89
17      5.60            48.34           6.95            2336.52         355687428095999.50              17193077802061576.00            2.00    18859677.31             911.66
18      5.71            52.51           7.25            2757.04         6402373705728005.00             336172818621200450.00           2.00    80014834.29             1215.80
19      5.83            56.76           7.53            3221.18         121645100408832080.00           6904023122705093600.00          2.00    348776576.63            1611.46
20      5.93            61.08           7.82            3730.45         2432902008176640500.00          148595289995348380000.00                2.00            1559776268.63           2123
.70

D:\Desktop\DAA\Assignment_48_Exp0>
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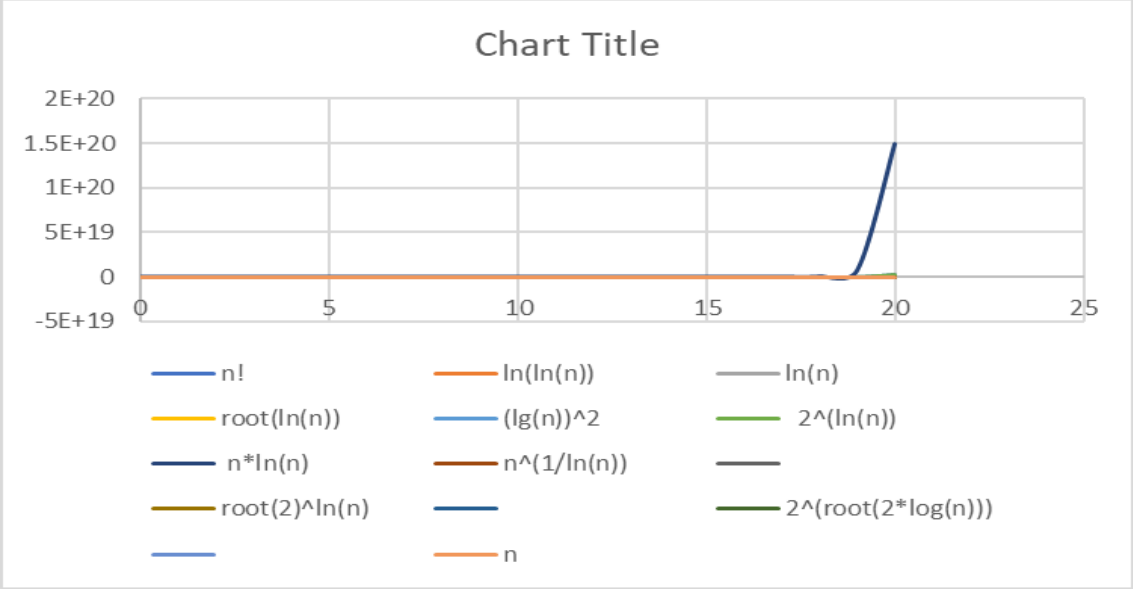

Conclusion:

Through this experiment , I learned about the nature of graph of various function by implementing it's logic in C programming language. I learned about inserting a graph in MS-Excel file which helped me in understanding more clearly through it's representation.