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Experiment No.	1-A

Aim: To implement the various functions e.g. linear, non-linear, quadratic, exponential etc.

Theory:

A function is a relation between a set of inputs and a set of permissible outputs with the property that each input is related to exactly one output. Let A & B be any two non-empty sets; mapping from A to B will be a function only when every element in set A has one end, only one image in set B.

Algorithm:

1. Run a for loop for i from 0 till 100.
2. Perform 11 functions: n, n^3, 2^n, ln n, lg n, n lg n, e^n, (3/2)^n, n.2^n, n!

Code:

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>

long fact(int num){
    if(num == 0){
        return num;
    }
    else{
        return num*fact(num-1);
    }
}
void main(){
    printf("Function 1: n cube\n");
    for(double i=0;i<=100;i++){
        printf("%.0lf\n",pow(i,3));


    }
    printf("Function 2: 2 raised to
root 2 log n\n");
    for(double i = 0;i<=100;i++){
        printf("%.3lf\n", pow(2,
sqrt(2*log2(i))));
    }
    printf("Function 3: (3/2) raised to
n\n");
    for(double i = 0;i<=100;i++) {

printf("%.3lf\n",pow((3.0/2.0),i));
    }
    printf("Function 4: n log n\n");
    for(double i = 0;i<=100;i++) {
        printf("%.3lf\n",i * log2(i));
    }
    printf("Function 5: ln n\n");
    for(double i = 0;i<=100;i++) {
        printf("%.3lf\n",log(i));
    }
    printf("Function 6: 2 raised to 2
raised to n\n");
    for(double i = 0;i<=100;i++) {

printf("%.3lf\n",pow(2,pow(2,i)));
    }
    printf("Function 7: n\n");
    for(double i = 0;i<=100;i++) {
        printf("%.3lf\n",i);
    }
    printf("Function 8: 2 raised to 2
raised to n+1\n");
    for(double i = 0;i<=100;i++) {

printf("%.3lf\n",pow(2,pow(2,i+1)));
    }
    printf("Function 9: e raised to
n\n");
    for(double i = 0;i<=100;i++) {
        printf("%.3lf\n",exp(i));
    }
    printf("Function 10: 2 raised to
log n\n");
    for(double i = 0;i<=100;i++) {
        printf("%.3lf\n",pow(2,log2(i)));
    }

}
```

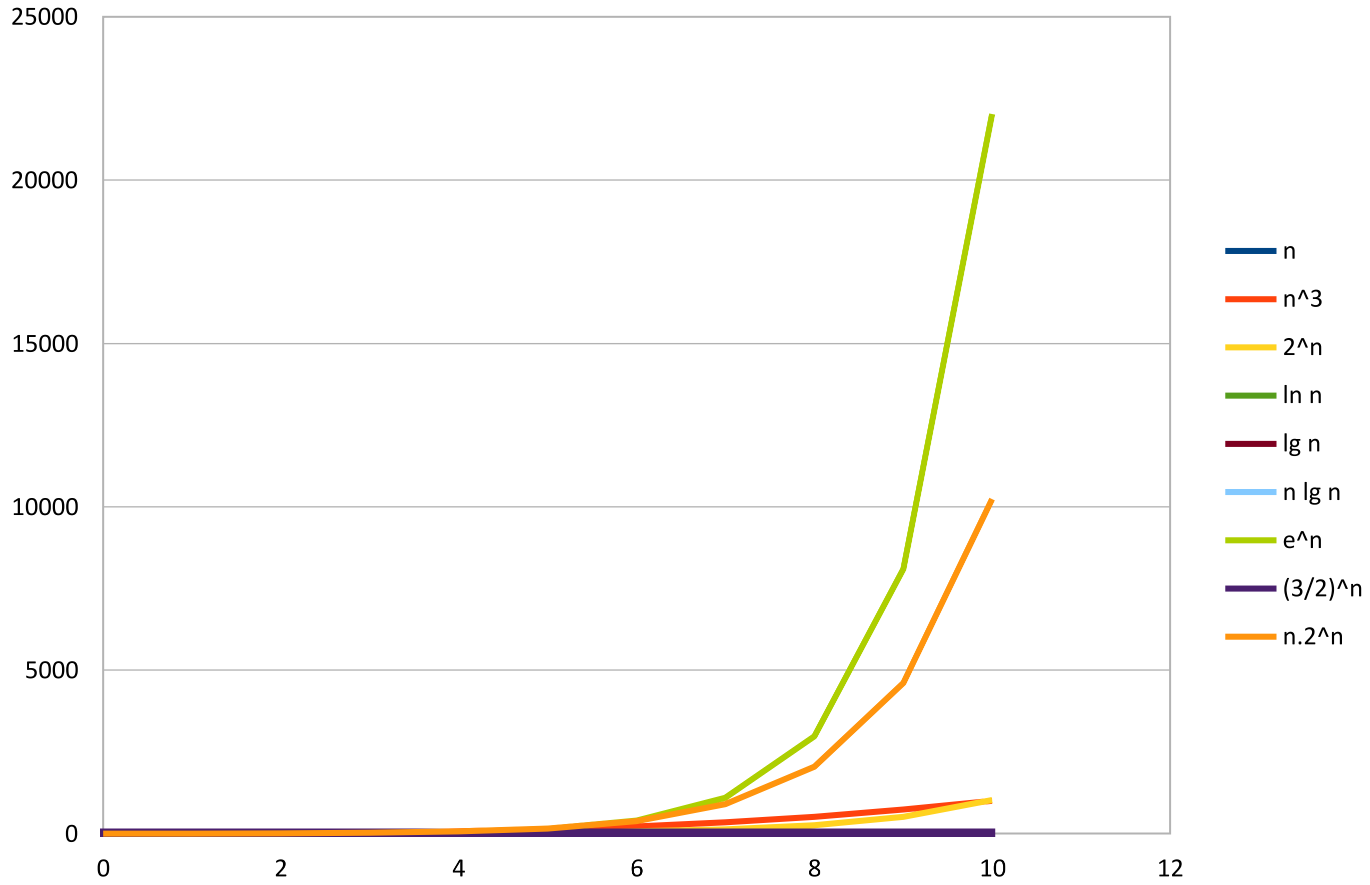
Table:

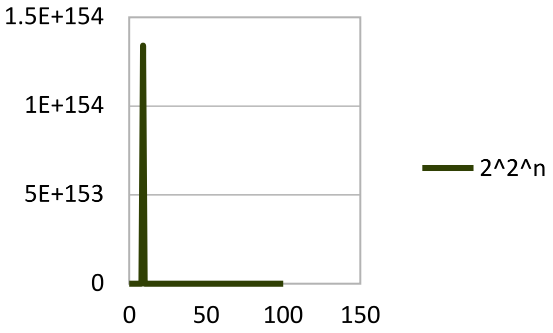
	n	n^3	2^n	ln n	lg n	n lg n	2^2^n	e^n	(3/2)^n	n.2^n	n!
0	0	0	1	-inf	-inf	-nan	2	1	1	0	1
1	1	1	2	0	0	0	4	2.72	1.5	2	1
2	2	8	4	0.69	1	2	16	7.39	2.25	8	2
3	3	27	8	1.1	1.58	4.75	256	20.09	3.38	24	6
4	4	64	16	1.39	2	8	65536	54.6	5.06	64	24
5	5	125	32	1.61	2.32	11.6	4E+09	148.41	7.59	160	120
6	6	216	64	1.79	2.58	15.5	2E+19	403.43	11.39	384	720
7	7	343	128	1.95	2.81	19.7	3E+38	1096.63	17.09	896	5040
8	8	512	256	2.08	3	24	1E+77	2980.96	25.63	2048	40320
9	9	729	512	2.2	3.17	28.5	1E+154	8103.08	38.44	4608	362880
10	10	1000	1024	2.3	3.32	33.2	inf	22026.5	57.67	10240	3628800
11	11	1331	2048	2.4	3.46	38.1	inf	59874.1	86.5	22528	4E+07
12	12	1728	4096	2.48	3.58	43	inf	162755	129.75	49152	4.8E+08

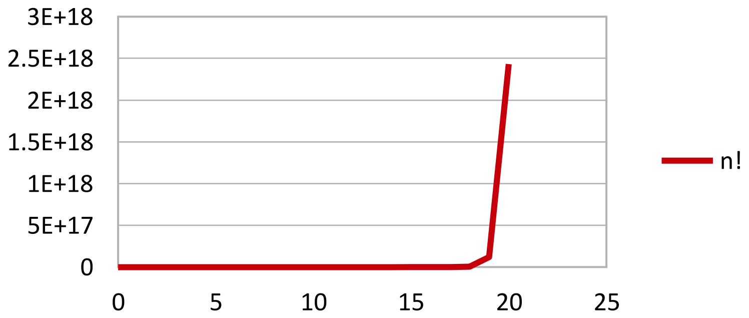
13	13	2197	8192	2.56	3.7	48.1	inf	442413	194.62	106496	6.2E+09
14	14	2744	16384	2.64	3.81	53.3	inf	1202604	291.93	229376	8.7E+10
15	15	3375	32768	2.71	3.91	58.6	inf	3269017	437.89	491520	1.3E+12
16	16	4096	65536	2.77	4	64	inf	8886111	656.84	1E+06	2.1E+13
17	17	4913	131072	2.83	4.09	69.5	inf	2.4E+07	985.26	2E+06	3.6E+14
18	18	5832	262144	2.89	4.17	75.1	inf	6.6E+07	1477.9	5E+06	6.4E+15
19	19	6859	524288	2.94	4.25	80.7	inf	1.8E+08	2216.8	1E+07	1.2E+17
20	20	8000	1048576	3	4.32	86.4	inf	4.9E+08	3325.3	2E+07	2.4E+18
21	21	9261	2097152	3.04	4.39	92.2	inf	1.3E+09	4987.9	4E+07	5.1E+19
22	22	10648	4194304	3.09	4.46	98.1	inf	3.6E+09	7481.8	9E+07	1.1E+21
23	23	12167	8388608	3.14	4.52	104	inf	9.7E+09	11223	2E+08	2.6E+22
24	24	13824	1.7E+07	3.18	4.58	110	inf	2.6E+10	16834	4E+08	6.2E+23
25	25	15625	3.4E+07	3.22	4.64	116	inf	7.2E+10	25251	8E+08	1.6E+25
26	26	17576	6.7E+07	3.26	4.7	122	inf	2E+11	37877	2E+09	4E+26
27	27	19683	1.3E+08	3.3	4.75	128	inf	5.3E+11	56815	4E+09	1.1E+28
28	28	21952	2.7E+08	3.33	4.81	135	inf	1.4E+12	85223	8E+09	3E+29
29	29	24389	5.4E+08	3.37	4.86	141	inf	3.9E+12	127834	2E+10	8.8E+30
30	30	27000	1.1E+09	3.4	4.91	147	inf	1.1E+13	191751	3E+10	2.7E+32
31	31	29791	2.1E+09	3.43	4.95	154	inf	2.9E+13	287627	7E+10	8.2E+33
32	32	32768	4.3E+09	3.47	5	160	inf	7.9E+13	431440	1E+11	2.6E+35
33	33	35937	8.6E+09	3.5	5.04	166	inf	2.1E+14	647160	3E+11	8.7E+36
34	34	39304	1.7E+10	3.53	5.09	173	inf	5.8E+14	970740	6E+11	3E+38
35	35	42875	3.4E+10	3.56	5.13	180	inf	1.6E+15	1E+06	1E+12	1E+40
36	36	46656	6.9E+10	3.58	5.17	186	inf	4.3E+15	2E+06	2E+12	3.7E+41
37	37	50653	1.4E+11	3.61	5.21	193	inf	1.2E+16	3E+06	5E+12	1.4E+43
38	38	54872	2.7E+11	3.64	5.25	199	inf	3.2E+16	5E+06	1E+13	5.2E+44
39	39	59319	5.5E+11	3.66	5.29	206	inf	8.7E+16	7E+06	2E+13	2E+46

40	40	64000	1.1E+12	3.69	5.32	213	inf	2.4E+17	1E+07	4E+13	8.2E+47
41	41	68921	2.2E+12	3.71	5.36	220	inf	6.4E+17	2E+07	9E+13	3.3E+49
42	42	74088	4.4E+12	3.74	5.39	226	inf	1.7E+18	2E+07	2E+14	1.4E+51
43	43	79507	8.8E+12	3.76	5.43	233	inf	4.7E+18	4E+07	4E+14	6E+52
44	44	85184	1.8E+13	3.78	5.46	240	inf	1.3E+19	6E+07	8E+14	2.7E+54
45	45	91125	3.5E+13	3.81	5.49	247	inf	3.5E+19	8E+07	2E+15	1.2E+56
46	46	97336	7E+13	3.83	5.52	254	inf	9.5E+19	1E+08	3E+15	5.5E+57
47	47	103823	1.4E+14	3.85	5.55	261	inf	2.6E+20	2E+08	7E+15	2.6E+59
48	48	110592	2.8E+14	3.87	5.58	268	inf	7E+20	3E+08	1E+16	1.2E+61
49	49	117649	5.6E+14	3.89	5.61	275	inf	1.9E+21	4E+08	3E+16	6.1E+62
50	50	125000	1.1E+15	3.91	5.64	282	inf	5.2E+21	6E+08	6E+16	3E+64
51	51	132651	2.3E+15	3.93	5.67	289	inf	1.4E+22	1E+09	1E+17	1.6E+66
52	52	140608	4.5E+15	3.95	5.7	296	inf	3.8E+22	1E+09	2E+17	8.1E+67
53	53	148877	9E+15	3.97	5.73	304	inf	1E+23	2E+09	5E+17	4.3E+69
54	54	157464	1.8E+16	3.99	5.75	311	inf	2.8E+23	3E+09	1E+18	2.3E+71
55	55	166375	3.6E+16	4.01	5.78	318	inf	7.7E+23	5E+09	2E+18	1.3E+73
56	56	175616	7.2E+16	4.03	5.81	325	inf	2.1E+24	7E+09	4E+18	7.1E+74
57	57	185193	1.4E+17	4.04	5.83	332	inf	5.7E+24	1E+10	8E+18	4.1E+76
58	58	195112	2.9E+17	4.06	5.86	340	inf	1.5E+25	2E+10	2E+19	2.4E+78
59	59	205379	5.8E+17	4.08	5.88	347	inf	4.2E+25	2E+10	3E+19	1.4E+80
60	60	216000	1.2E+18	4.09	5.91	354	inf	1.1E+26	4E+10	7E+19	8.3E+81
61	61	226981	2.3E+18	4.11	5.93	362	inf	3.1E+26	6E+10	1E+20	5.1E+83
62	62	238328	4.6E+18	4.13	5.95	369	inf	8.4E+26	8E+10	3E+20	3.1E+85
63	63	250047	9.2E+18	4.14	5.98	377	inf	2.3E+27	1E+11	6E+20	2E+87
64	64	262144	1.8E+19	4.16	6	384	inf	6.2E+27	2E+11	1E+21	1.3E+89
65	65	274625	3.7E+19	4.17	6.02	391	inf	1.7E+28	3E+11	2E+21	8.2E+90
66	66	287496	7.4E+19	4.19	6.04	399	inf	4.6E+28	4E+11	5E+21	5.4E+92
67	67	300763	1.5E+20	4.2	6.07	406	inf	1.3E+29	6E+11	1E+22	3.6E+94
68	68	314432	3E+20	4.22	6.09	414	inf	3.4E+29	9E+11	2E+22	2.5E+96
69	69	328509	5.9E+20	4.23	6.11	421	inf	9.3E+29	1E+12	4E+22	1.7E+98
70	70	343000	1.2E+21	4.25	6.13	429	inf	2.5E+30	2E+12	8E+22	1E+100
71	71	357911	2.4E+21	4.26	6.15	437	inf	6.8E+30	3E+12	2E+23	9E+101
72	72	373248	4.7E+21	4.28	6.17	444	inf	1.9E+31	5E+12	3E+23	6E+103
73	73	389017	9.4E+21	4.29	6.19	452	inf	5.1E+31	7E+12	7E+23	4E+105
74	74	405224	1.9E+22	4.3	6.21	460	inf	1.4E+32	1E+13	1E+24	3E+107
75	75	421875	3.8E+22	4.32	6.23	467	inf	3.7E+32	2E+13	3E+24	2E+109
76	76	438976	7.6E+22	4.33	6.25	475	inf	1E+33	2E+13	6E+24	2E+111
77	77	456533	1.5E+23	4.34	6.27	483	inf	2.8E+33	4E+13	1E+25	1E+113
78	78	474552	3E+23	4.36	6.29	490	inf	7.5E+33	5E+13	2E+25	1E+115
79	79	493039	6E+23	4.37	6.3	498	inf	2E+34	8E+13	5E+25	9E+116
80	80	512000	1.2E+24	4.38	6.32	506	inf	5.5E+34	1E+14	1E+26	7E+118
81	81	531441	2.4E+24	4.39	6.34	514	inf	1.5E+35	2E+14	2E+26	6E+120
82	82	551368	4.8E+24	4.41	6.36	521	inf	4.1E+35	3E+14	4E+26	5E+122
83	83	571787	9.7E+24	4.42	6.38	529	inf	1.1E+36	4E+14	8E+26	4E+124
84	84	592704	1.9E+25	4.43	6.39	537	inf	3E+36	6E+14	2E+27	3E+126
85	85	614125	3.9E+25	4.44	6.41	545	inf	8.2E+36	9E+14	3E+27	3E+128
86	86	636056	7.7E+25	4.45	6.43	553	inf	2.2E+37	1E+15	7E+27	2E+130

87	87	658503	1.5E+26	4.47	6.44	561	inf	6.1E+37	2E+15	1E+28	2E+132
88	88	681472	3.1E+26	4.48	6.46	568	inf	1.7E+38	3E+15	3E+28	2E+134
89	89	704969	6.2E+26	4.49	6.48	576	inf	4.5E+38	5E+15	6E+28	2E+136
90	90	729000	1.2E+27	4.5	6.49	584	inf	1.2E+39	7E+15	1E+29	1E+138
91	91	753571	2.5E+27	4.51	6.51	592	inf	3.3E+39	1E+16	2E+29	1E+140
92	92	778688	5E+27	4.52	6.52	600	inf	9E+39	2E+16	5E+29	1E+142
93	93	804357	9.9E+27	4.53	6.54	608	inf	2.5E+40	2E+16	9E+29	1E+144
94	94	830584	2E+28	4.54	6.55	616	inf	6.7E+40	4E+16	2E+30	1E+146
95	95	857375	4E+28	4.55	6.57	624	inf	1.8E+41	5E+16	4E+30	1E+148
96	96	884736	7.9E+28	4.56	6.58	632	inf	4.9E+41	8E+16	8E+30	1E+150
97	97	912673	1.6E+29	4.57	6.6	640	inf	1.3E+42	1E+17	2E+31	1E+152
98	98	941192	3.2E+29	4.58	6.61	648	inf	3.6E+42	2E+17	3E+31	9E+153
99	99	970299	6.3E+29	4.6	6.63	656	inf	9.9E+42	3E+17	6E+31	9E+155
100	100	1E+06	1.3E+30	4.61	6.64	664	inf	2.7E+43	4E+17	1E+32	9E+157







Function	**Observation**
Function 1: n	The output increases linearly(gradually) as value of n increases.
Function 2: n^3	The output increases slowly initially but as value of n becomes big, the output changes quite much
Function 3: 2^n	The output increases slowly initially but as value of n becomes big, the output changes quite much
Function 4: ln n	The output increases greatly initially but then it does not increase that much
Function 5: lg n	The output increases greatly initially but then it does not increase that much
Function 6: n lg n	The output increases linearly(gradually) as value of n increases.
Function 7: 2^2^n	Very high output value for small values of n
Function 8: e^n	The output increases slowly initially but as value of n becomes big, the output changes quite much
Function 9: (3/2)^n	The output increases slowly initially but as value of n becomes big, the output changes quite much
Function 10: n.2^n	The output increases slowly initially but as value of n becomes big, the output changes quite much
Function 11: n!	The output increases slowly initially but as value of n becomes big, the output changes quite much

Overall observation: The output increases as value of n increases

Conclusion: Successfully executed the program for 11 different functions and also observed the trend for 100 values of n by creating graphs for every function and also by plotting then on one graph