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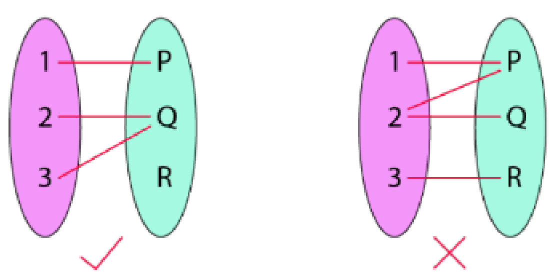
SUBJECT	DAA
EXPERIMENT NO :	1-A
BATCH:	COMPS-A (A)
AIM:	To implement the various functions e.g. linear, non-linear, quadratic, exponential etc.
THEORY	A function is a relation between a set of inputs and a set of permissible outputs with the property that each input is related to exactly one output. 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.



PROGRAM:

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

void main(){
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%d\n",(int)pow(n,3));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
```

	`` printf("%.2f\n",pow(1.5,n)); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",log2(n)); } printf("\n"); for(int n=1;n<=100;n++){ printf("%d\n",n); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",pow(2,n)); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",(n*log2(n))); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",log2(log2(n))); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",sqrt(log(n))); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",pow(2,log2(n))); } printf("\n"); for(int n=1;n<=100;n++){ printf("%.2f\n",log(n)); } printf("\n"); } ```

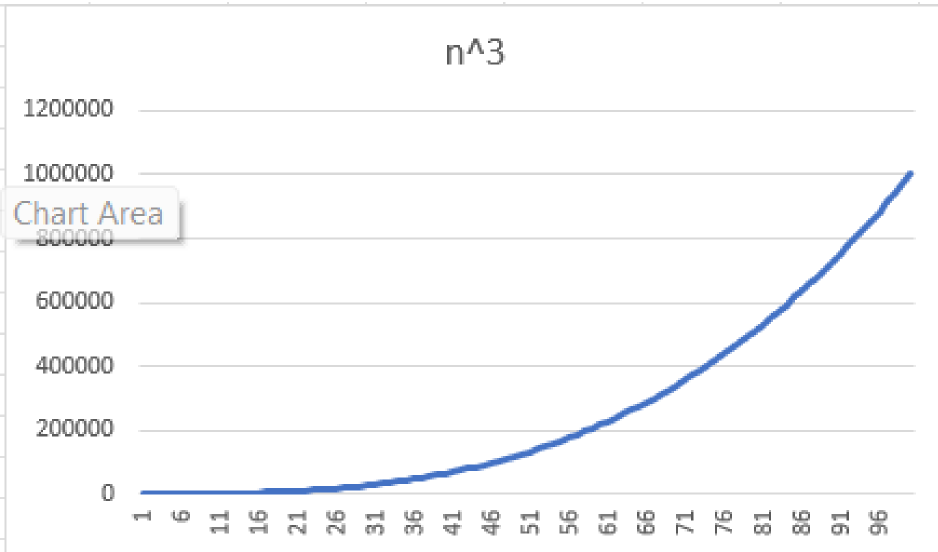
```
    printf("%.2f\n",pow(1.5,n));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",log2(n));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%d\n",n);
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",pow(2,n));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",(n*log2(n)));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",log2(log2(n)));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",sqrt(log(n)));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",pow(2,log2(n)));
    }
    printf("\n");
    for(int n=1;n<=100;n++){
    printf("%.2f\n",log(n) );
    }
    printf("\n");
}
```

OBSERVATION:

value of N	n^3	(3/2)^n	log^n	n	2^n	n(log(n)	log(log(n	√ln(n)	2^(log(n))	ln(2)
1	1	1.5	0	1	2	0		0	1	0
2	8	2.25	1	2	4	2	0	0.83	2	0.69
3	27	3.38	1.58	3	8	4.75	0.66	1.05	3	1.1
4	64	5.06	2	4	16	8	1	1.18	4	1.39
5	124	7.59	2.32	5	32	11.61	1.22	1.27	5	1.61
6	216	11.39	2.58	6	64	15.51	1.37	1.34	6	1.79
7	343	17.09	2.81	7	128	19.65	1.49	1.39	7	1.95
8	512	25.63	3	8	256	24	1.58	1.44	8	2.08
9	729	38.44	3.17	9	512	28.53	1.66	1.48	9	2.2
10	1000	57.67	3.32	10	1024	33.22	1.73	1.52	10	2.3
11	1331	86.5	3.46	11	2048	38.05	1.79	1.55	11	2.4
12	1728	129.75	3.58	12	4096	43.02	1.84	1.58	12	2.48
13	2197	194.62	3.7	13	8192	48.11	1.89	1.6	13	2.56
14	2744	291.93	3.81	14	16384	53.3	1.93	1.62	14	2.64
15	3375	437.89	3.91	15	32768	58.6	1.97	1.65	15	2.71
16	4096	656.84	4	16	65536	64	2	1.67	16	2.77
17	4912	985.26	4.09	17	131072	69.49	2.03	1.68	17	2.83
18	5832	1477.89	4.17	18	262144	75.06	2.06	1.7	18	2.89
19	6858	2216.84	4.25	19	524288	80.71	2.09	1.72	19	2.94
20	8000	3325.26	4.32	20	1048576	86.44	2.11	1.73	20	3
21	9260	4987.89	4.39	21	2097152	92.24	2.13	1.74	21	3.04
22	10648	7481.83	4.46	22	4194304	98.11	2.16	1.76	22	3.09
23	12167	11222.74	4.52	23	8388608	104.04	2.18	1.77	23	3.14
24	13824	16834.11	4.58	24	16777216	110.04	2.2	1.78	24	3.18
25	15624	25251.17	4.64	25	33554432	116.1	2.22	1.79	25	3.22
26	17576	37876.75	4.7	26	67108864	122.21	2.23	1.81	26	3.26
27	19683	56815.13	4.75	27	134217728	128.38	2.25	1.82	27	3.3
28	21952	85222.69	4.81	28	268435456	134.61	2.27	1.83	28	3.33
29	24389	127834.04	4.86	29	536870912	140.88	2.28	1.84	29	3.37
30	27000	191751.06	4.91	30	1073741824	147.21	2.29	1.84	30	3.4
31	29790	287626.59	4.95	31	2147483648	153.58	2.31	1.85	31	3.43
32	32768	431439.88	5	32	4294967296	160	2.32	1.86	32	3.47
33	35937	647159.82	5.04	33	8589934592	166.47	2.33	1.87	33	3.5
34	39303	970739.74	5.09	34	17179869184	172.97	2.35	1.88	34	3.53
35	42874	1456109.61	5.13	35	34359738368	179.52	2.36	1.89	35	3.56
36	46656	2184164.41	5.17	36	68719476736	186.12	2.37	1.89	36	3.58
37	50653	3276246.61	5.21	37	1.37439E+11	192.75	2.38	1.9	37	3.61

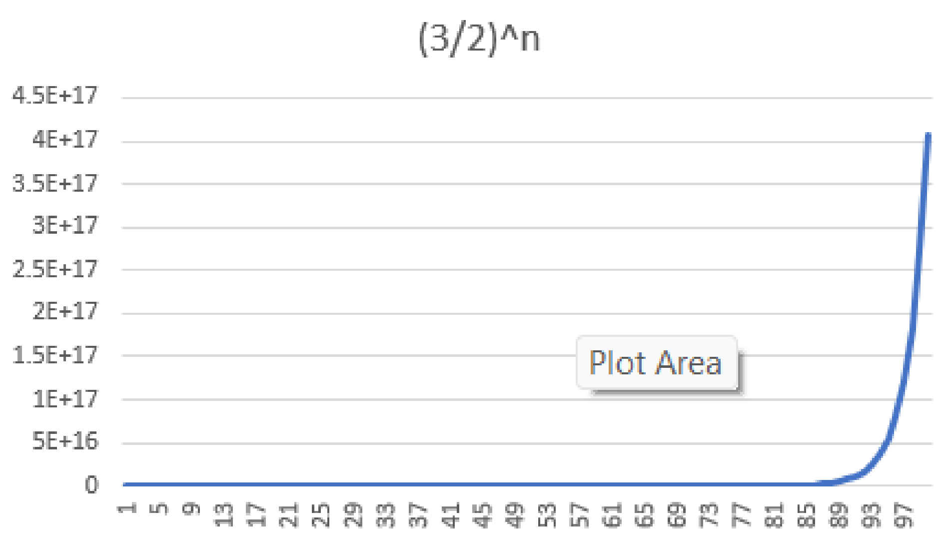
38	54871	4914369.92	5.25	38	2.74878E+11	199.42	2.39	1.91	38	3.64
39	59319	7371554.88	5.29	39	5.49756E+11	206.13	2.4	1.91	39	3.66
40	64000	11057332.32	5.32	40	1.09951E+12	212.88	2.41	1.92	40	3.69
41	68921	16585998.48	5.36	41	2.19902E+12	219.66	2.42	1.93	41	3.71
42	74088	24878997.72	5.39	42	4.39805E+12	226.48	2.43	1.93	42	3.74
43	79507	37318496.58	5.43	43	8.79609E+12	233.33	2.44	1.94	43	3.76
44	85183	55977744.87	5.46	44	1.75922E+13	240.21	2.45	1.95	44	3.78
45	91124	83966617.31	5.49	45	3.51844E+13	247.13	2.46	1.95	45	3.81
46	97335	125949926	5.52	46	7.03687E+13	254.08	2.47	1.96	46	3.83
47	103823	188924889	5.55	47	1.40737E+14	261.07	2.47	1.96	47	3.85
48	110592	283387333.4	5.58	48	2.81475E+14	268.08	2.48	1.97	48	3.87
49	117649	425081000.1	5.61	49	5.6295E+14	275.12	2.49	1.97	49	3.89
50	125000	637621500.2	5.64	50	1.1259E+15	282.19	2.5	1.98	50	3.91
51	132651	956432250.3	5.67	51	2.2518E+15	289.29	2.5	1.98	51	3.93
52	140608	1434648375	5.7	52	4.5036E+15	296.42	2.51	1.99	52	3.95
53	148876	2151972563	5.73	53	9.0072E+15	303.58	2.52	1.99	53	3.97
54	157464	3227958845	5.75	54	1.80144E+16	310.76	2.52	2	54	3.99
55	166375	4841938267	5.78	55	3.60288E+16	317.97	2.53	2	55	4.01
56	175616	7262907401	5.81	56	7.20576E+16	325.21	2.54	2.01	56	4.03
57	185193	10894361101	5.83	57	1.44115E+17	332.47	2.54	2.01	57	4.04
58	195111	16341541652	5.86	58	2.8823E+17	339.76	2.55	2.02	58	4.06
59	205379	24512312478	5.88	59	5.76461E+17	347.08	2.56	2.02	59	4.08
60	215999	36768468717	5.91	60	1.15292E+18	354.41	2.56	2.02	60	4.09
61	226981	55152703075	5.93	61	2.30584E+18	361.77	2.57	2.03	61	4.11
62	238328	82729054613	5.95	62	4.61169E+18	369.16	2.57	2.03	62	4.13
63	250047	1.24094E+11	5.98	63	9.22337E+18	376.57	2.58	2.04	63	4.14
64	262144	1.8614E+11	6	64	1.84467E+19	384	2.58	2.04	64	4.16
65	274624	2.79211E+11	6.02	65	3.68935E+19	391.45	2.59	2.04	65	4.17
66	287495	4.18816E+11	6.04	66	7.3787E+19	398.93	2.6	2.05	66	4.19
67	300763	6.28224E+11	6.07	67	1.47574E+20	406.43	2.6	2.05	67	4.2
68	314432	9.42336E+11	6.09	68	2.95148E+20	413.95	2.61	2.05	68	4.22
69	328508	1.4135E+12	6.11	69	5.90296E+20	421.49	2.61	2.06	69	4.23
70	342999	2.12026E+12	6.13	70	1.18059E+21	429.05	2.62	2.06	70	4.25
71	357911	3.18038E+12	6.15	71	2.36118E+21	436.63	2.62	2.06	71	4.26
72	373248	4.77057E+12	6.17	72	4.72237E+21	444.23	2.63	2.07	72	4.28
73	389017	7.15586E+12	6.19	73	9.44473E+21	451.86	2.63	2.07	73	4.29
74	405224	1.07338E+13	6.21	74	1.88895E+22	459.5	2.63	2.07	74	4.3
75	421875	1.61007E+13	6.23	75	3.77789E+22	467.16	2.64	2.08	75	4.32
76	438976	2.4151E+13	6.25	76	7.55579E+22	474.84	2.64	2.08	76	4.33
77	456532	3.62265E+13	6.27	77	1.51116E+23	482.54	2.65	2.08	77	4.34
78	474552	5.43398E+13	6.29	78	3.02231E+23	490.26	2.65	2.09	78	4.36
79	493039	8.15097E+13	6.3	79	6.04463E+23	498	2.66	2.09	79	4.37
80	511999	1.22265E+14	6.32	80	1.20893E+24	505.75	2.66	2.09	80	4.38
81	531441	1.83397E+14	6.34	81	2.41785E+24	513.53	2.66	2.1	81	4.39
82	551368	2.75095E+14	6.36	82	4.8357E+24	521.32	2.67	2.1	82	4.41
83	571787	4.12643E+14	6.38	83	9.67141E+24	529.13	2.67	2.1	83	4.42
84	592704	6.18965E+14	6.39	84	1.93428E+25	536.95	2.68	2.1	84	4.43
85	614124	9.28447E+14	6.41	85	3.86856E+25	544.8	2.68	2.11	85	4.44
86	636056	1.39267E+15	6.43	86	7.73713E+25	552.66	2.68	2.11	86	4.45
87	658502	2.08901E+15	6.44	87	1.54743E+26	560.54	2.69	2.11	87	4.47
88	681471	3.13351E+15	6.46	88	3.09485E+26	568.43	2.69	2.12	88	4.48
89	704969	4.70026E+15	6.48	89	6.1897E+26	576.34	2.7	2.12	89	4.49
90	728999	7.05039E+15	6.49	90	1.23794E+27	584.27	2.7	2.12	90	4.5
91	753571	1.05756E+16	6.51	91	2.47588E+27	592.21	2.7	2.12	91	4.51
92	778687	1.58634E+16	6.52	92	4.95176E+27	600.17	2.71	2.13	92	4.52
93	804357	2.37951E+16	6.54	93	9.90352E+27	608.14	2.71	2.13	93	4.53
94	830584	3.56926E+16	6.55	94	1.9807E+28	616.13	2.71	2.13	94	4.54
95	857374	5.35389E+16	6.57	95	3.96141E+28	624.14	2.72	2.13	95	4.55
96	884736	8.03084E+16	6.58	96	7.92282E+28	632.16	2.72	2.14	96	4.56
97	912672	1.20463E+17	6.6	97	1.58456E+29	640.19	2.72	2.14	97	4.57
98	941192	1.80694E+17	6.61	98	3.16913E+29	648.24	2.73	2.14	98	4.58
99	970298	2.71041E+17	6.63	99	6.33825E+29	656.31	2.73	2.14	99	4.6
100	1000000	4.06561E+17	6.64	100	1.26765E+30	664.39	2.73	2.15	100	4.61

Graph for f(n)= n^3:



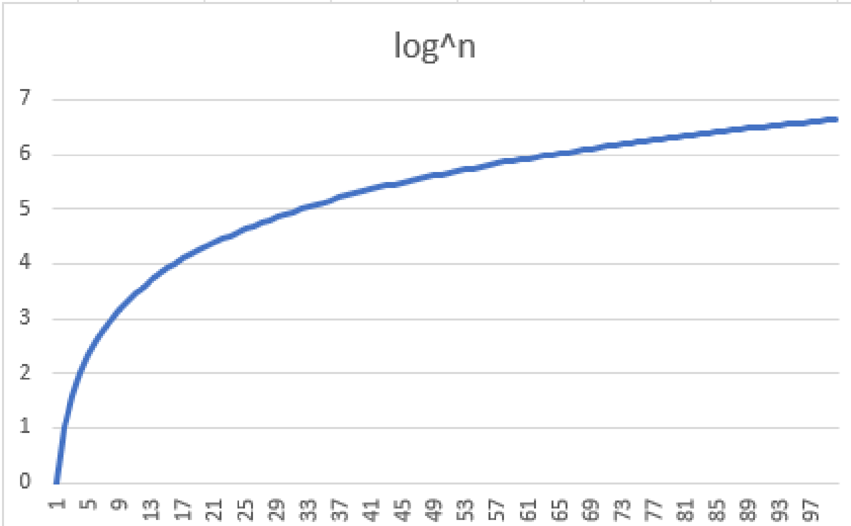
It can be seen that the graph increases in a cubic manner with the increase in n value. it was uniform till n=20 and after that it increases rapidly.

Graph for f(n)= (3/2) ^n:



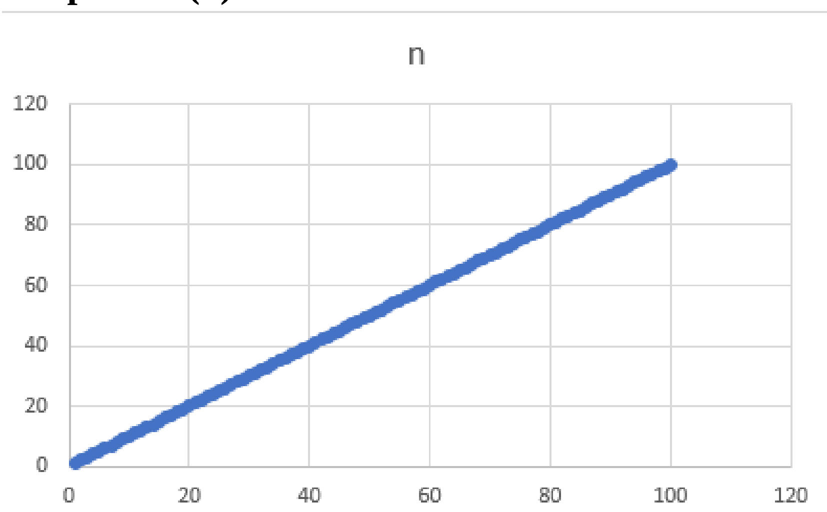
It can be seen that for even small value of n, f(n) value is big. The value rises exponentially and for n>83 there is a sharp value hike which reaches beyond 4E+17 value.

Graph for f(n)= log^n:



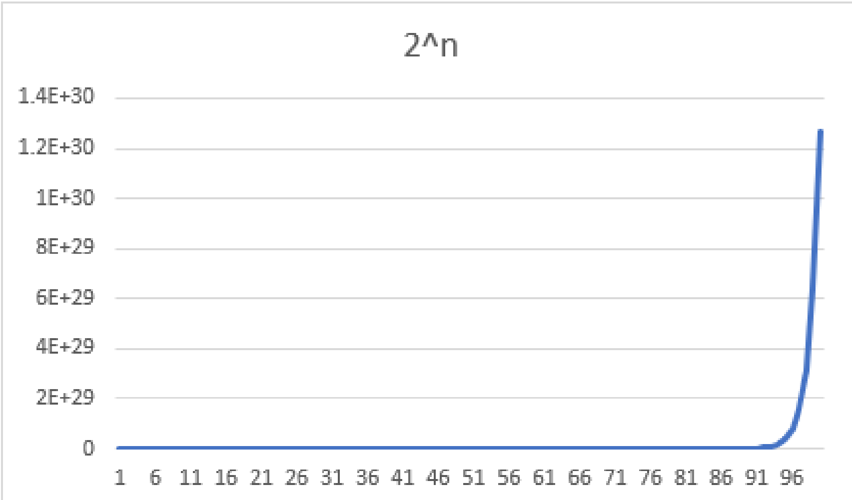
Initially the graph grows fast but slows down. i.e after n = 55 the value of f(n) increases very slowly increase in n. The function is invalid for n = 0. Also for any value of n the value of f(n) is small.

Graph for f(n)= n:



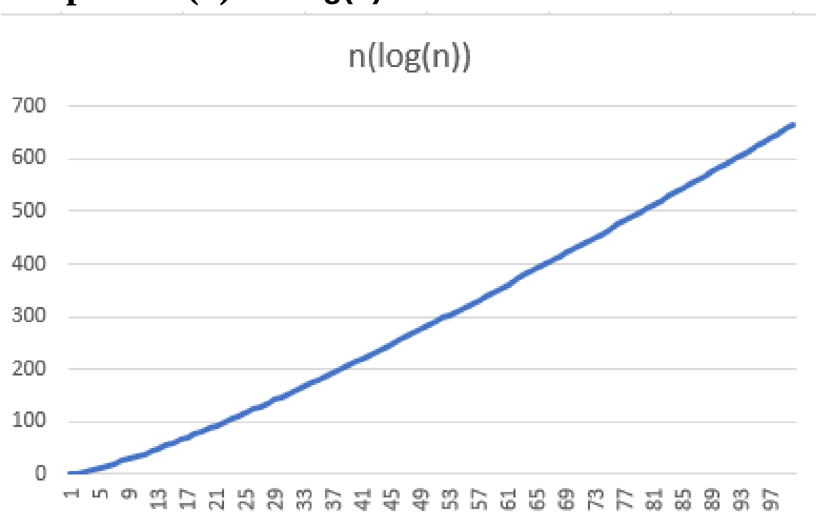
In this graph, f(n) increase linearly with n.

Graph for f(n)= 2^n:



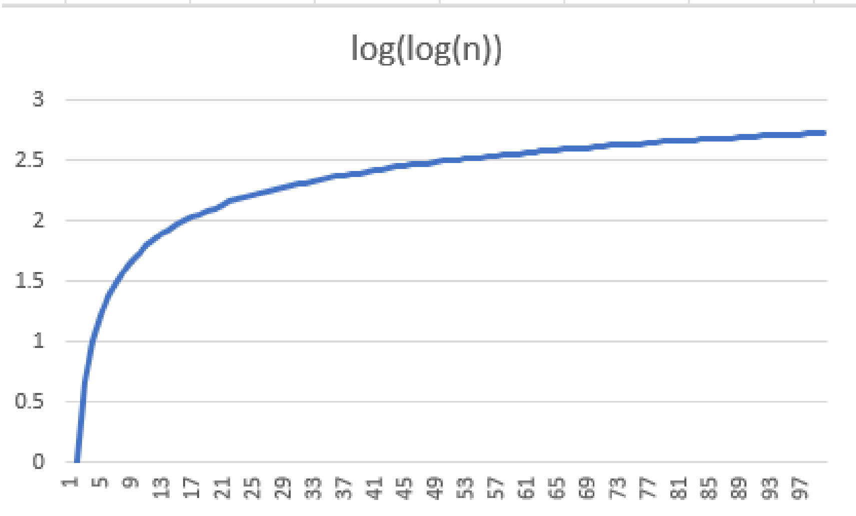
The graph is uniform or like changing a bit till 85 but when n>85 it rises exponentially and rise up to 1.4E+30.

Graph for f(n)= n*log(n):



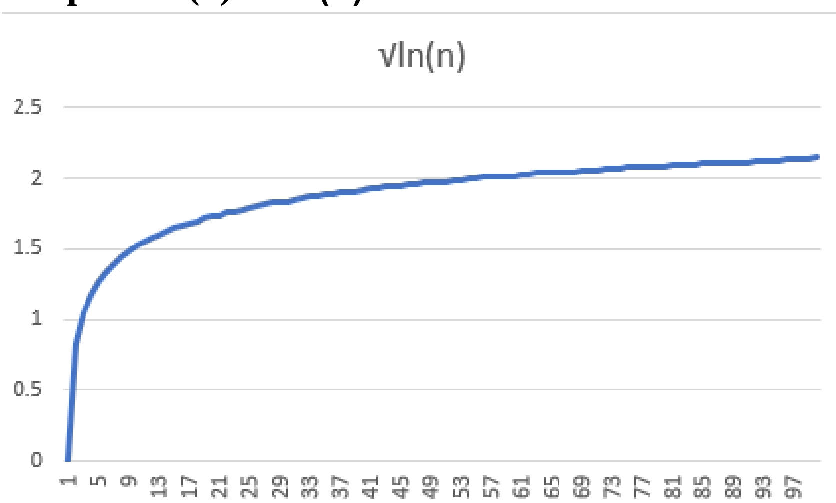
The graph is straight line but as n increases value of f(n) increases rapidly. The function is not valid for x = 0.

Graph for f(n)= log(log(n)):



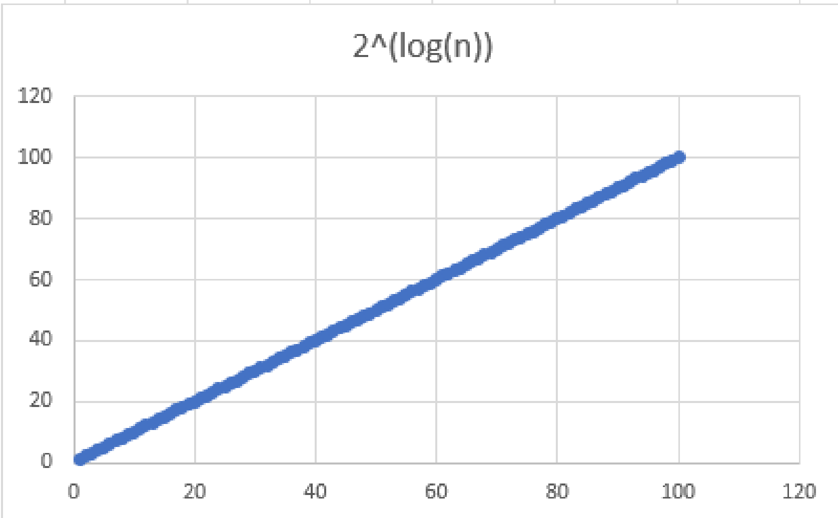
The graph has a sharp rise in start but later on for n>37 it nearly becomes constant. Also, the function is invalid for n=0.

Graph for f(n)= √ln(n):



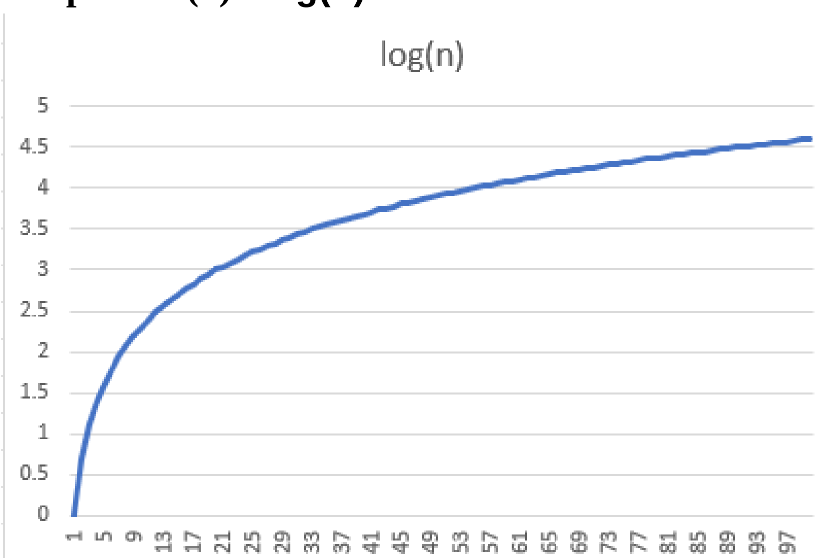
The graph has a sharp rise in start but later on for n>41 it nearly becomes constant. Also, the function is invalid for n=0.

Graph for f(n)= 2^(log(n)):



From this graph it can be observed that the function increases linearly with the value for n. It is a straight line.

Graph for f(n)= log(n):



Initially the graph grows fast but slows down. i.e. after x = 60 the value of f(x) increases very slowly increase in x. The function is invalid for x = 0

CONCLUSION:	Through this experiment I understood the growth of functions. For example logarithmic functions grow slowly with increase in x while exponential functions grow rapidly with increase in x.