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Experiment No.	1a
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Aim: To implement the various functions e.g. linear, non-linear, quadratic, exponential etc

Algorithm:

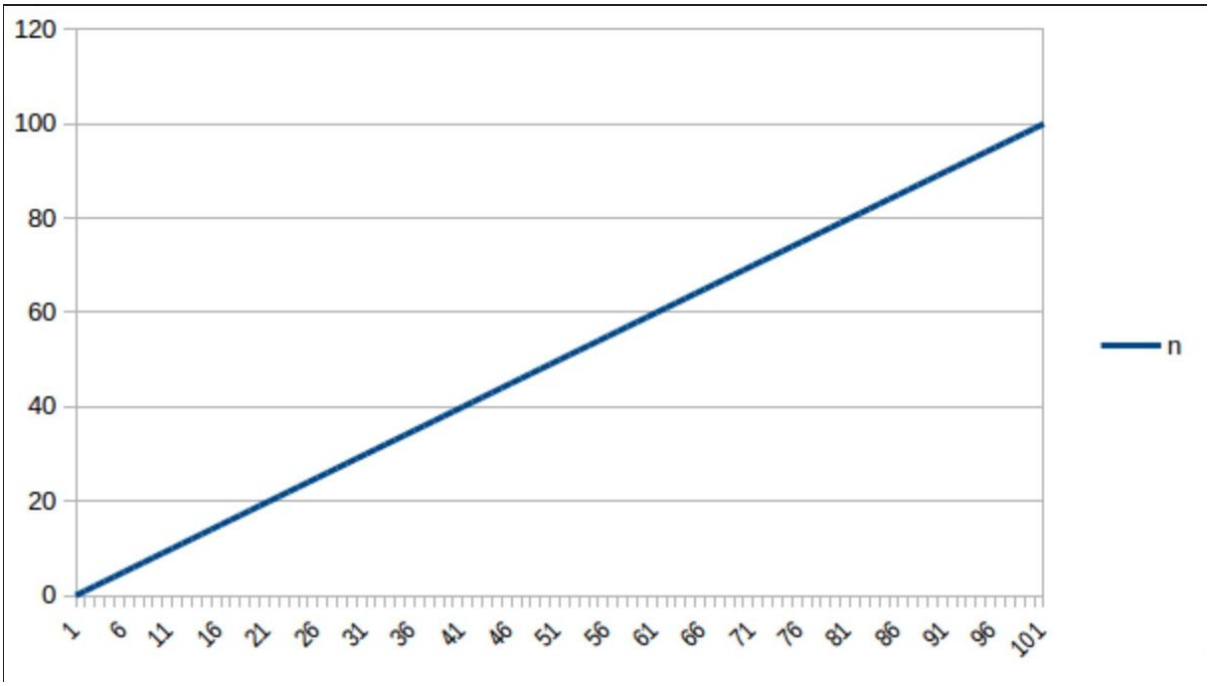
1.Start
2.initialize i=0
3.using math.h library , print values of functions i, i^3, 2^i, ln i, lg i, i lg i, $2^{2\wedge i}$, e^i, $(3/2)^i$, i 2^i, i!
4.increment i
5.repeat steps 3 and 4 till i<1000
6.initialize i=1,fact=1
7.fact = fact * i
8.print fact
9.repeat step 7 till i<=20
10.Stop

Observation/Theory:

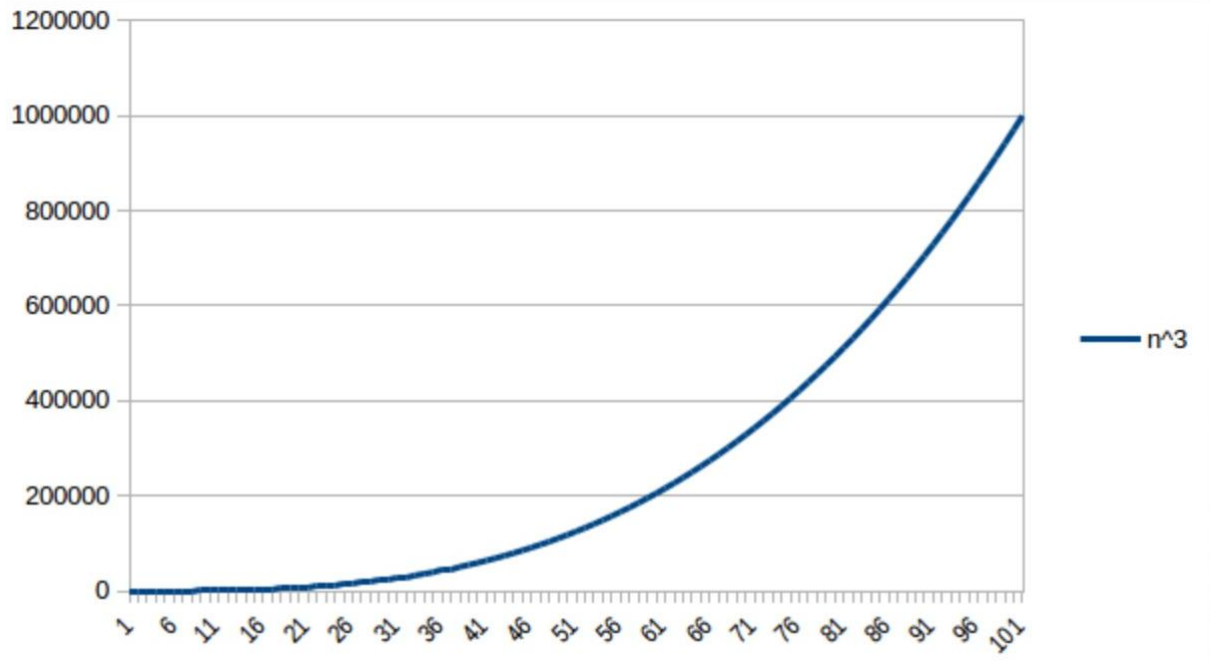
The chosen functions are:

n, n^3, 2^n, ln n, lg n, n lg n, $2^{2^{\wedge}n}$, e^n, $(3/2)^n$, n 2^n, n!

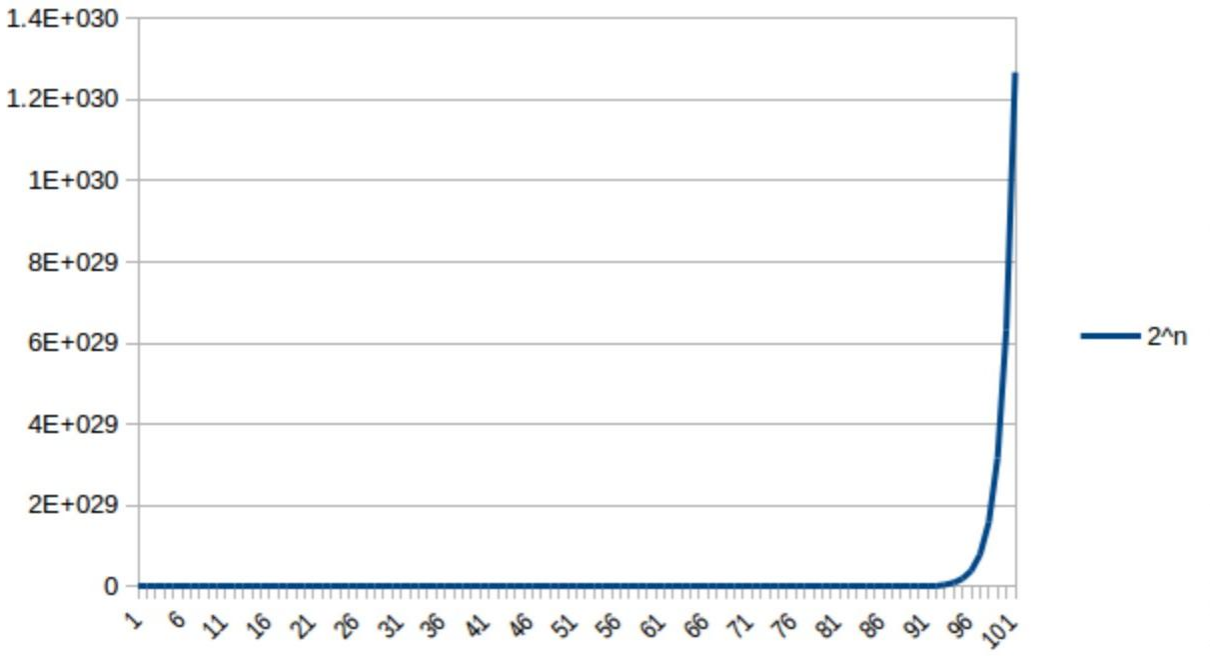
The graphs of these functions are :



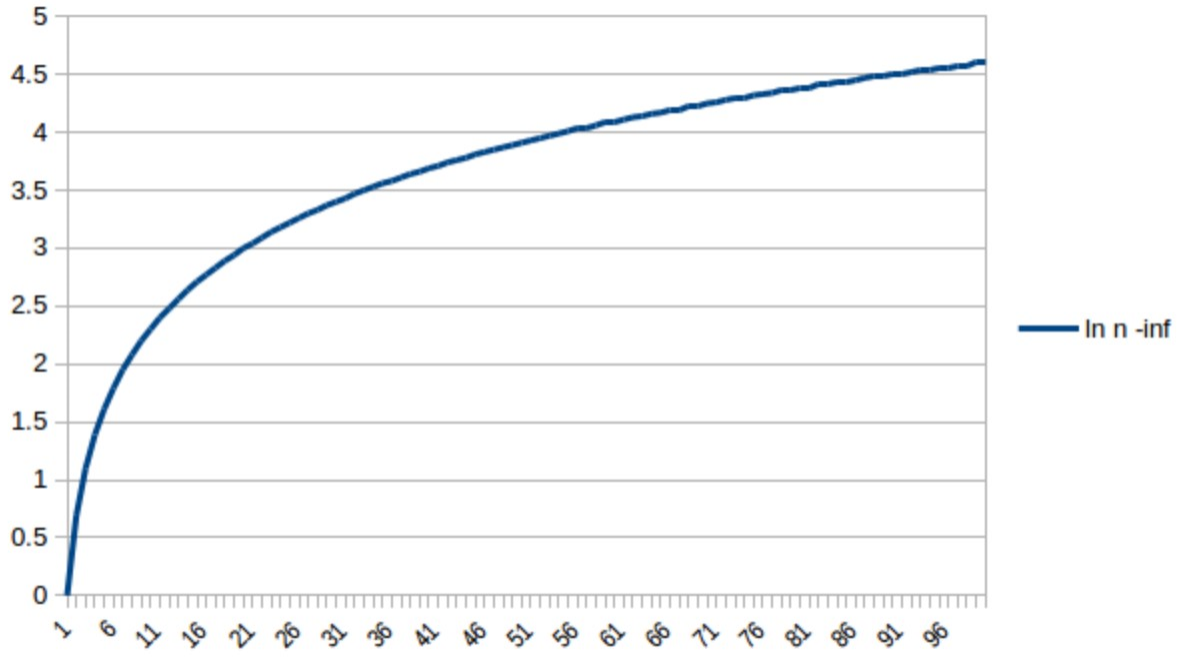
This is a linear graph which passes through 0 and has equal slop with both axis.



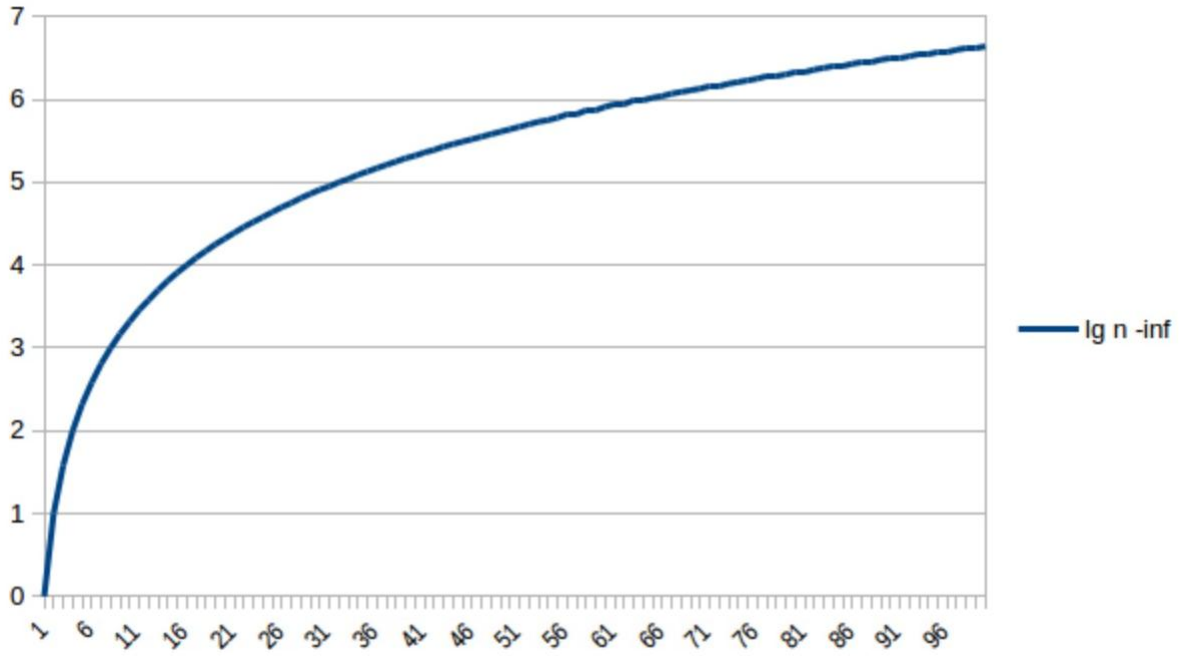
This is an increasing function whose slope is positive and it passes through 0.



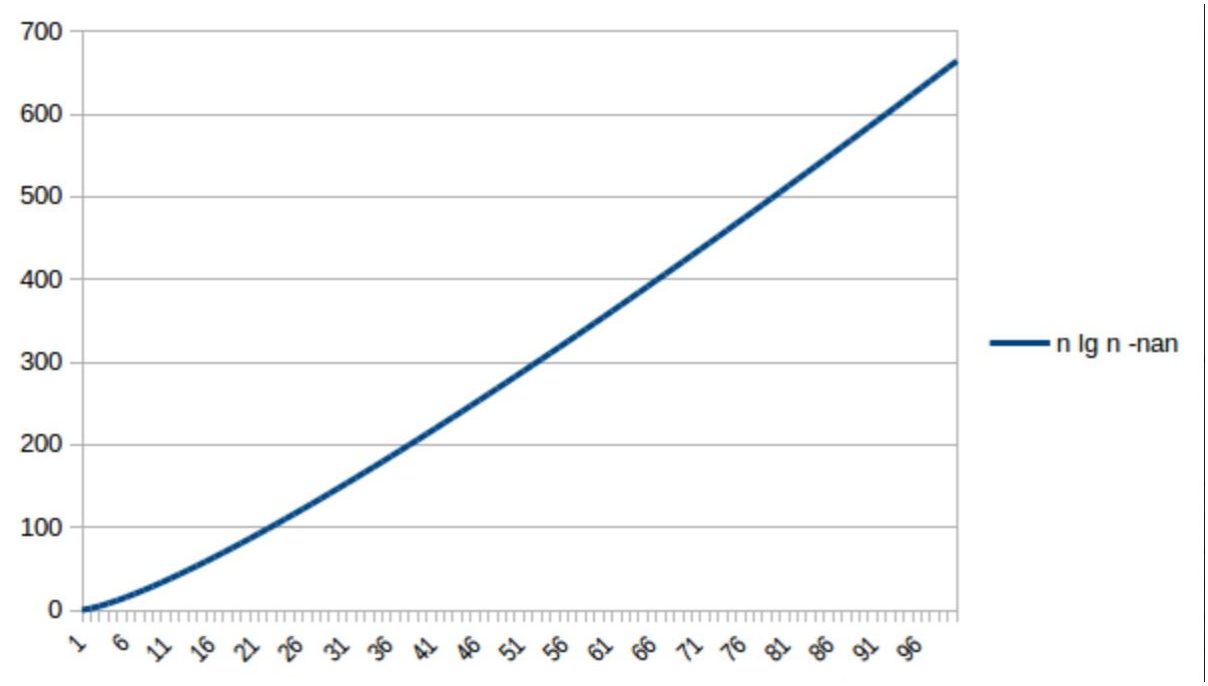
This graph passes (0,1) on y-axis and it slopes goes on increasing.



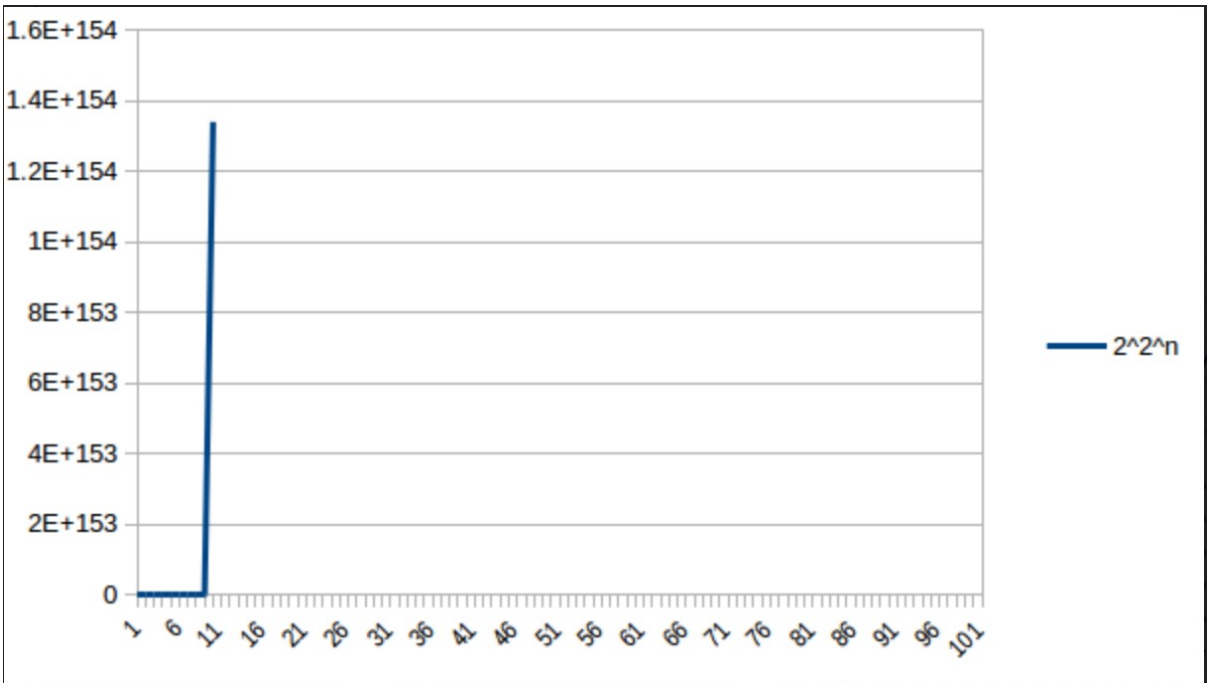
This graph passes through (1,0) on x axis



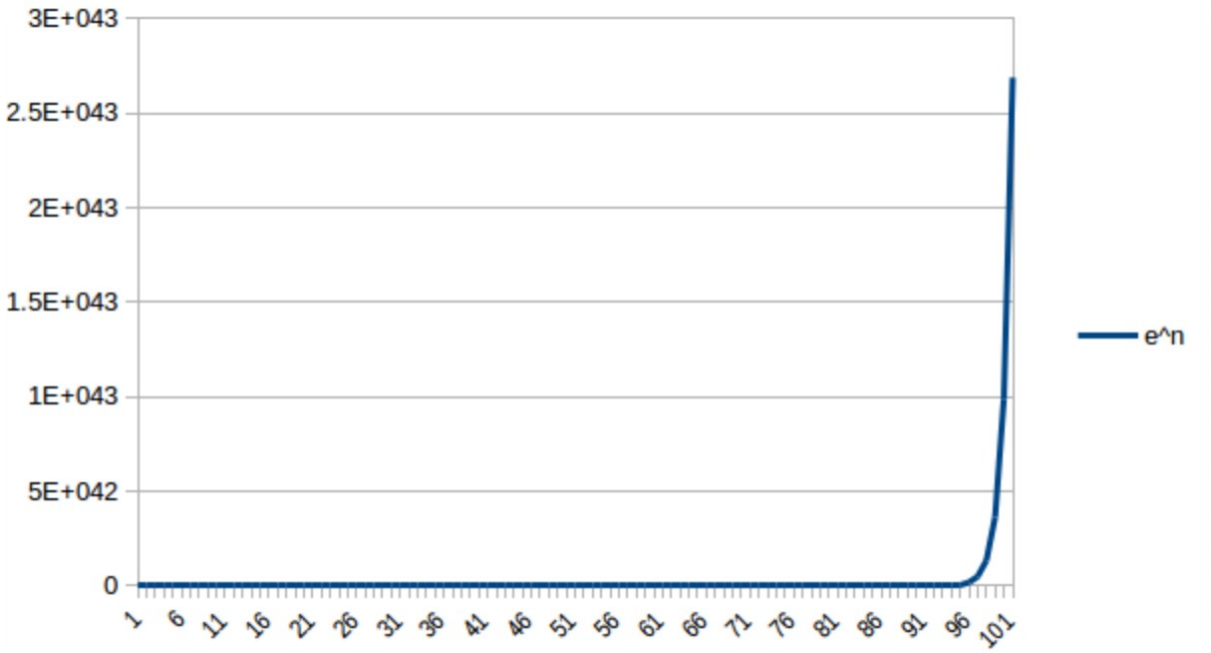
This graph passes through (1,0) on x axis.



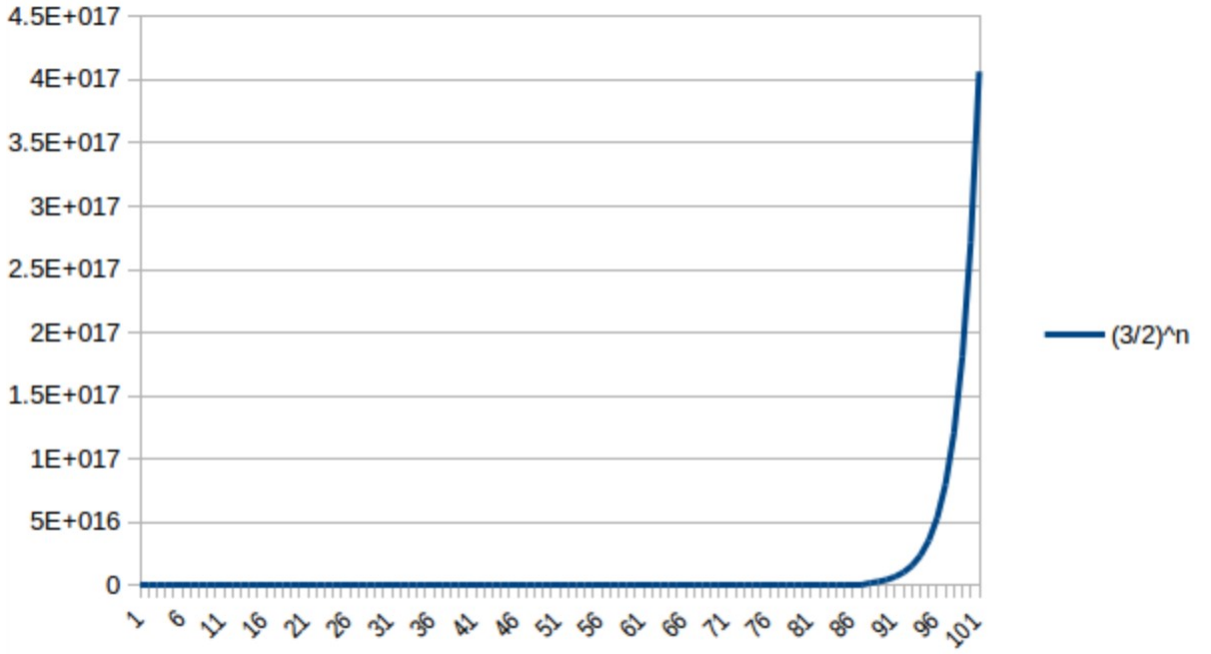
The graph has minimum value till (0.36) and then the graph goes on increasing and intersects the x axis at (1,0)



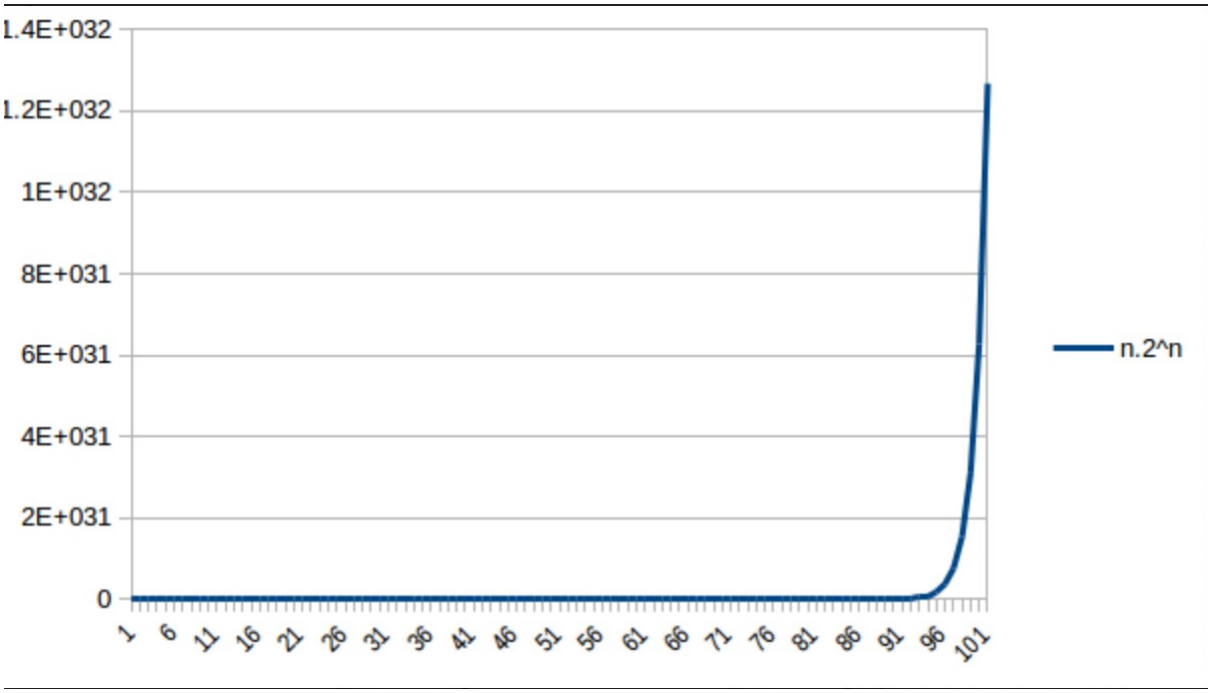
The graph intersects y axis at (0,2) and goes on increasing.

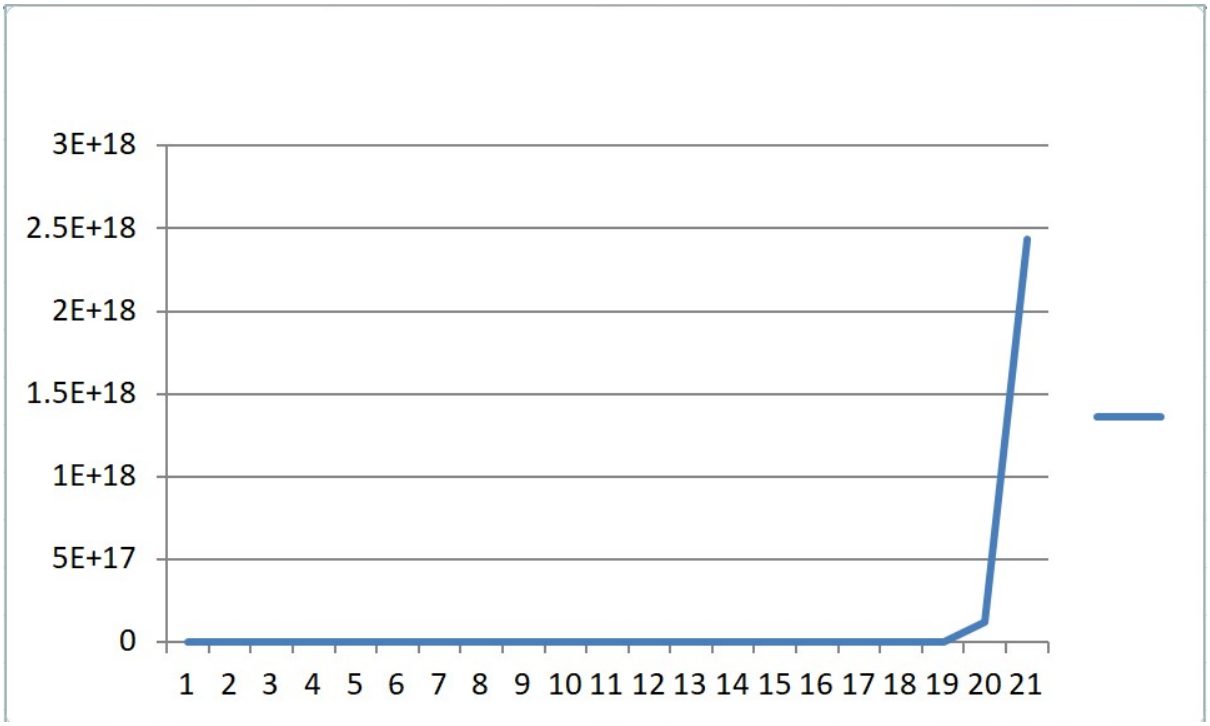


The graph intersects the y axis at (0,1) and has an increasing slope.



The graph intersects the y axis at (0,1) and goes on increasing.





The slope of graph goes on increasing.

Code:

DAA lab code > C exp0.c > main()

```c
#include <stdio.h>
#include <math.h>
int main()
{
    printf("\tn \tn3 \t2^n \tln n \tlg n \tn lg n \t2^2^n \te^n \t(3/2)^n \tn.2^n");
    for (double i = 0; i < 101; i++)
    {
        printf("\n%.2lf", i);
        printf("\t%.2lf", i);
        printf("\t%.2lf", pow(2, i));
        printf("\t%.2lf", pow(2, i));
        printf("\t%.2lf", log(i));
        printf("\t%.2lf", log2(i));
        printf("\t%.2lf", i * log2(i));
        printf("\t%.2lf", pow(2, pow(2, i)));
        printf("\t%.2lf", exp(i));
        printf("\t%.2lf", pow(1.5, i));
        printf("\t%.2lf", i * pow(2, i));
    }

    int i;
    int fact = 1;
    for (i = 1; i <= 20; i++)
    {
        fact = fact * i;
        printf("\t%d", fact);
    }
    return 0;
}
```

Output:

The values in the output taking n from 0 to 100 are as follows:

	n	n^3	2^n	ln n	lg n	n lg n	2^2^n	e^n	(3/2)^n	n.2^n
0	0	0	1	-inf	-inf	-nan	2	1	1	0
1	1	1	2	0	0	0	4	2.72	1.5	2
2	2	8	4	0.69	1	2	16	7.39	2.25	8
3	3	27	8	1.1	1.58	4.75	256	20.09	3.38	24
4	4	64	16	1.39	2	8	65536	54.6	5.06	64
5	5	125	32	1.61	2.32	11.61	4294967296	148.41	7.59	160
6	6	216	64	1.79	2.58	15.51	1.84467E+19	403.43	11.39	384
7	7	343	128	1.95	2.81	19.65	3.40282E+38	1096.63	17.09	896
8	8	512	256	2.08	3	24	1.15792E+77	2980.96	25.63	2048
9	9	729	512	2.2	3.17	28.53	1.34078E+154	8103.08	38.44	4608
10	10	1000	1024	2.3	3.32	33.22	inf	22026.47	57.67	10240
11	11	1331	2048	2.4	3.46	38.05	inf	59874.14	86.5	22528
12	12	1728	4096	2.48	3.58	43.02	inf	162754.79	129.75	49152
13	13	2197	8192	2.56	3.7	48.11	inf	442413.39	194.62	106496
14	14	2744	16384	2.64	3.81	53.3	inf	1202604.28	291.93	229376
15	15	3375	32768	2.71	3.91	58.6	inf	3269017.37	437.89	491520
16	16	4096	65536	2.77	4	64	inf	8886110.52	656.84	1048576
17	17	4913	131072	2.83	4.09	69.49	inf	24154952.75	985.26	2228224
18	18	5832	262144	2.89	4.17	75.06	inf	65659969.14	1477.89	4718592
19	19	6859	524288	2.94	4.25	80.71	inf	178482301	2216.84	9961472
20	20	8000	1048576	3	4.32	86.44	inf	485165195.4	3325.26	20971520
21	21	9261	2097152	3.04	4.39	92.24	inf	1318815734	4987.89	44040192
22	22	10648	4194304	3.09	4.46	98.11	inf	3584912846	7481.83	92274688
23	23	12167	8388608	3.14	4.52	104.04	inf	9744803446	11222.74	192937984
24	24	13824	16777216	3.18	4.58	110.04	inf	26489122130	16834.11	402653184
25	25	15625	33554432	3.22	4.64	116.1	inf	72004899337	25251.17	838860800
26	26	17576	67108864	3.26	4.7	122.21	inf	195729609429	37876.75	1744830464
27	27	19683	134217728	3.3	4.75	128.38	inf	532048240602	56815.13	3623878656
28	28	21952	268435456	3.33	4.81	134.61	inf	144625706429	85222.69	7516192768
29	29	24389	536870912	3.37	4.86	140.88	inf	393133429714	127834.04	15569256448
30	30	27000	1073741824	3.4	4.91	147.21	inf	106864745815	191751.06	32212254720
30	30	27000	1073741824	3.4	4.91	147.21	inf	106864745815	191751.06	32212254720
31	31	29791	2147483648	3.43	4.95	153.58	inf	290488496652	287626.59	66571993088
32	32	32768	4294967296	3.47	5	160	inf	789629601826	431439.88	137438953472
33	33	35937	8589934592	3.5	5.04	166.47	inf	214643579785	647159.82	283467841536
34	34	39304	17179869184	3.53	5.09	172.97	inf	583461742527	970739.74	584115552256
35	35	42875	34359738368	3.56	5.13	179.52	inf	1.58601E+15	1456109.61	120259084288
36	36	46656	68719476736	3.58	5.17	186.12	inf	4.31123E+15	2184164.41	247390116249
37	37	50653	137438953472	3.61	5.21	192.75	inf	1.17191E+16	3276246.61	508524127846
38	38	54872	274877906944	3.64	5.25	199.42	inf	3.18559E+16	4914369.92	104453604638
39	39	59319	549755813888	3.66	5.29	206.13	inf	8.65934E+16	7371554.88	214404767416
40	40	64000	109951162777	3.69	5.32	212.88	inf	2.35385E+17	11057332.32	439804651110
41	41	68921	219902325555	3.71	5.36	219.66	inf	6.39843E+17	16585998.48	901599534776
42	42	74088	439804651110	3.74	5.39	226.48	inf	1.73927E+18	24878997.72	184717953466
43	43	79507	879609302220	3.76	5.43	233.33	inf	4.72784E+18	37318496.58	378231999954
44	44	85184	175921860444	3.78	5.46	240.21	inf	1.28516E+19	55977744.87	774056185954
45	45	91125	351843720888	3.81	5.49	247.13	inf	3.49343E+19	83966617.31	1.5833E+15
46	46	97336	703687441776	3.83	5.52	254.08	inf	9.49612E+19	125949926	3.23696E+15
47	47	103823	140737488355	3.85	5.55	261.07	inf	2.58131E+20	188924889	6.61466E+15
48	48	110592	281474976710	3.87	5.58	268.08	inf	7.01674E+20	283387333.4	1.35108E+16
49	49	117649	562949953421	3.89	5.61	275.12	inf	1.90735E+21	425081000.1	2.75845E+16
50	50	125000	1.1259E+15	3.91	5.64	282.19	inf	5.18471E+21	637621500.2	5.6295E+16
51	51	132651	2.2518E+15	3.93	5.67	289.29	inf	1.40935E+22	956432250.3	1.14842E+17
52	52	140608	4.5036E+15	3.95	5.7	296.42	inf	3.83101E+22	1434648375	2.34187E+17
53	53	148877	9.0072E+15	3.97	5.73	303.58	inf	1.04138E+23	2151972563	4.77382E+17
54	54	157464	1.80144E+16	3.99	5.75	310.76	inf	2.83075E+23	3227958845	9.72778E+17
55	55	166375	3.60288E+16	4.01	5.78	317.97	inf	7.69479E+23	4841938267	1.98158E+18
56	56	175616	7.20576E+16	4.03	5.81	325.21	inf	2.09166E+24	7262907401	4.03523E+18
57	57	185193	1.44115E+17	4.04	5.83	332.47	inf	5.68572E+24	10894361101	8.21457E+18
58	58	195112	2.8823E+17	4.06	5.86	339.76	inf	1.54554E+25	16341541652	1.67174E+19
59	59	205379	5.76461E+17	4.08	5.88	347.08	inf	4.20121E+25	24512312478	3.40112E+19
60	60	216000	1.15292E+18	4.09	5.91	354.41	inf	1.14201E+26	36768468717	6.91753E+19

61	61	226981	2.30584E+18	4.11	5.93	361.77	inf	3.1043E+26	55152703075	1.40656E+20
62	62	238328	4.61169E+18	4.13	5.95	369.16	inf	8.43836E+26	82729054613	2.85925E+20
63	63	250047	9.22337E+18	4.14	5.98	376.57	inf	2.29378E+27	124093581920	5.81072E+20
64	64	262144	1.84467E+19	4.16	6	384	inf	6.23515E+27	186140372879	1.18059E+21
65	65	274625	3.68935E+19	4.17	6.02	391.45	inf	1.69489E+28	279210559319	2.39808E+21
66	66	287496	7.3787E+19	4.19	6.04	398.93	inf	4.60719E+28	418815838979	4.86994E+21
67	67	300763	1.47574E+20	4.2	6.07	406.43	inf	1.25236E+29	628223758468	9.88745E+21
68	68	314432	2.95148E+20	4.22	6.09	413.95	inf	3.40428E+29	942335637702	2.00701E+22
69	69	328509	5.90296E+20	4.23	6.11	421.49	inf	9.25378E+29	141350345655	4.07304E+22
70	70	343000	1.18059E+21	4.25	6.13	429.05	inf	2.51544E+30	212025518483	8.26414E+22
71	71	357911	2.36118E+21	4.26	6.15	436.63	inf	6.83767E+30	318038277724	1.67644E+23
72	72	373248	4.72237E+21	4.28	6.17	444.23	inf	1.85867E+31	477057416586	3.4001E+23
73	73	389017	9.44473E+21	4.29	6.19	451.86	inf	5.05239E+31	715586124880	6.89466E+23
74	74	405224	1.88895E+22	4.3	6.21	459.5	inf	1.37338E+32	107337918732	1.39782E+24
75	75	421875	3.77789E+22	4.32	6.23	467.16	inf	3.73324E+32	161006878098	2.83342E+24
76	76	438976	7.55579E+22	4.33	6.25	474.84	inf	1.0148E+33	241510317147	5.7424E+24
77	77	456533	1.51116E+23	4.34	6.27	482.54	inf	2.75851E+33	362265475720	1.16359E+25
78	78	474552	3.02231E+23	4.36	6.29	490.26	inf	7.49842E+33	543398213580	2.35741E+25
79	79	493039	6.04463E+23	4.37	6.3	498	inf	2.03828E+34	815097320371	4.77526E+25
80	80	512000	1.20893E+24	4.38	6.32	505.75	inf	5.54062E+34	122264598055	9.67141E+25
81	81	531441	2.41785E+24	4.39	6.34	513.53	inf	1.5061E+35	183396897083	1.95846E+26
82	82	551368	4.8357E+24	4.41	6.36	521.32	inf	4.094E+35	275095345625	3.96528E+26
83	83	571787	9.67141E+24	4.42	6.38	529.13	inf	1.11286E+36	412643018438	8.02727E+26
84	84	592704	1.93428E+25	4.43	6.39	536.95	inf	3.02508E+36	618964527657	1.6248E+27
85	85	614125	3.86856E+25	4.44	6.41	544.8	inf	8.22301E+36	928446791485	3.28828E+27
86	86	636056	7.73713E+25	4.45	6.43	552.66	inf	2.23525E+37	1.39267E+15	6.65393E+27
87	87	658503	1.54743E+26	4.47	6.44	560.54	inf	6.07603E+37	2.08901E+15	1.34626E+28
88	88	681472	3.09485E+26	4.48	6.46	568.43	inf	1.65164E+38	3.13351E+15	2.72347E+28
89	89	704969	6.1897E+26	4.49	6.48	576.34	inf	4.48961E+38	4.70026E+15	5.50883E+28
90	90	729000	1.23794E+27	4.5	6.49	584.27	inf	1.2204E+39	7.05039E+15	1.11415E+29

90	90	729000	1.23794E+27	4.5	6.49	584.27	inf	1.2204E+39	7.05039E+15	1.11415E+29
91	91	753571	2.47588E+27	4.51	6.51	592.21	inf	3.3174E+39	1.05756E+16	2.25305E+29
92	92	778688	4.95176E+27	4.52	6.52	600.17	inf	9.01763E+39	1.58634E+16	4.55562E+29
93	93	804357	9.90352E+27	4.53	6.54	608.14	inf	2.45125E+40	2.37951E+16	9.21027E+29
94	94	830584	1.9807E+28	4.54	6.55	616.13	inf	6.66318E+40	3.56926E+16	1.86186E+30
95	95	857375	3.96141E+28	4.55	6.57	624.14	inf	1.81124E+41	5.35389E+16	3.76334E+30
96	96	884736	7.92282E+28	4.56	6.58	632.16	inf	4.92346E+41	8.03084E+16	7.6059E+30
97	97	912673	1.58456E+29	4.57	6.6	640.19	inf	1.33833E+42	1.20463E+17	1.53703E+31
98	98	941192	3.16913E+29	4.58	6.61	648.24	inf	3.63797E+42	1.80694E+17	3.10574E+31
99	99	970299	6.33825E+29	4.6	6.63	656.31	inf	9.88903E+42	2.71041E+17	6.27487E+31
100	100	1000000	1.26765E+30	4.61	6.64	664.39	inf	2.68812E+43	4.06561E+17	1.26765E+32

The observed values for n! from n 1 to 20 are as follows:

	n!
1	1
2	2
3	6
4	24
5	120
6	720
7	5040
8	40320
9	362880
10	3628800
11	39916800
12	479001600
13	6227020800
14	87178291200
15	1.30767E+12
16	2.09228E+13
17	3.55687E+14
18	6402373705728000
19	1.21645E+17
20	2.4329E+18

Conclusion:I observed and understood the different linear, quadratic, exponential graphs .For the coding part I used the math.h library of C and used inbuilt functions like pow, exp.