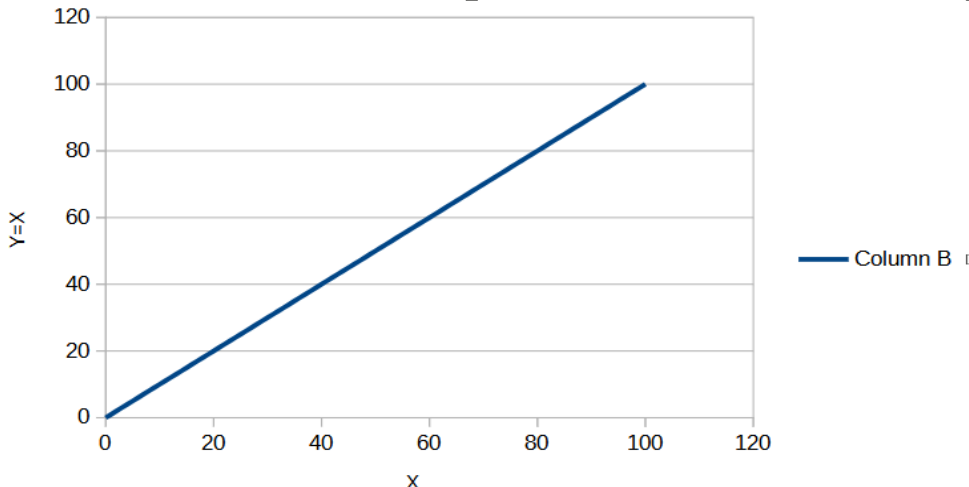
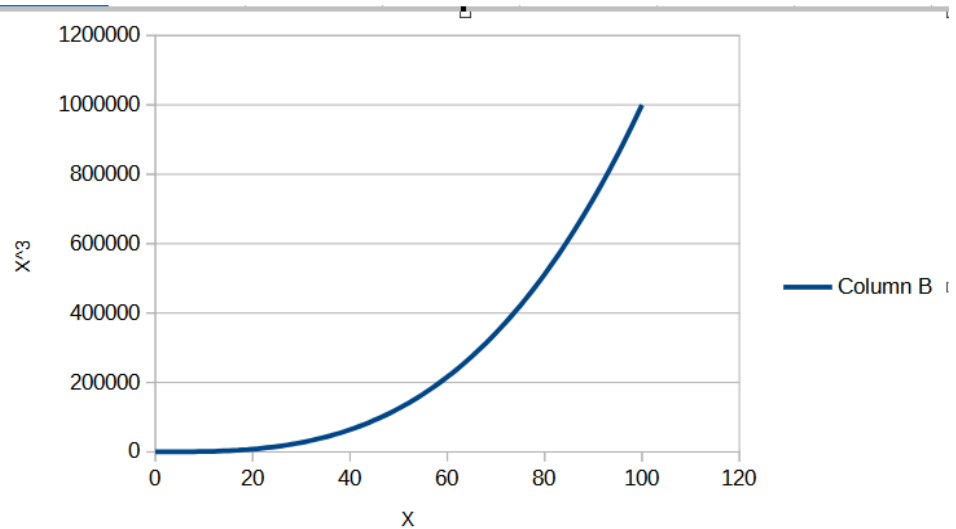


NAME:	Bhavesh Prashant Chaudhari
UID:	2021300018
SUBJECT	DAA
EXPERIMENT NO :	0
DATE OF PERFORMANCE	26/1/2023
DATE OF SUBMISSION	2/1/23
AIM:	To implement the various functions e.g. linear, non-linear, quadratic, exponential etc.
PROBLEM STATEMENT 1:	
THEORY	<p>1.)Graph for $f(x) = x$:</p>  <p>It can be seen through graph that as value of x increase,value of $f(x)$ also increase linearly.</p>

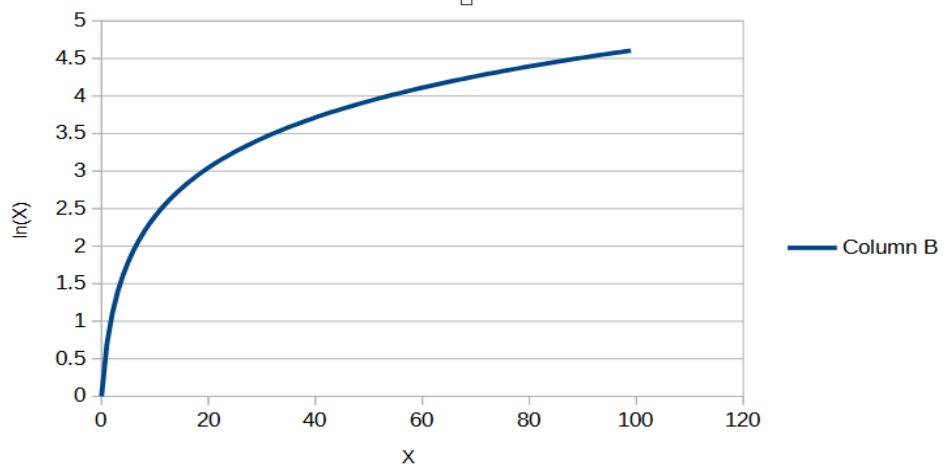
The function outputs valid values for all numbers between 0 to 100.

2.) Graph for $f(x) = x^3$:



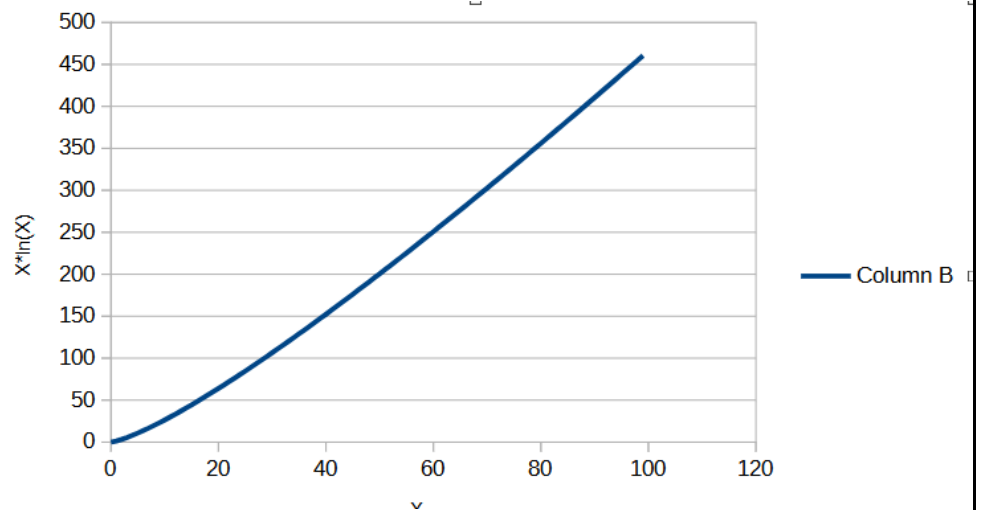
With increase in value of x the value of $f(x)$ increase in cubic manner. The graph almost seems to be uniform till 20 but after exceeding 20 the value of $f(x)$ changes rapidly.

3.) Graph for $f(x) = \ln(x)$:



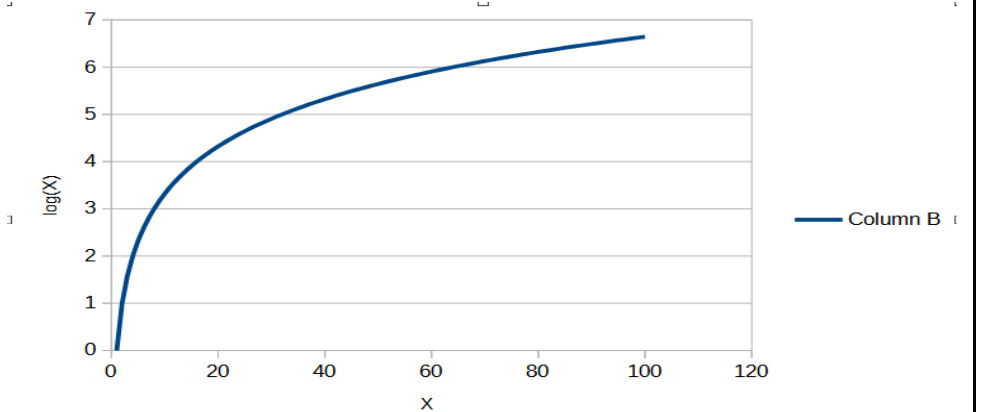
According to graph the value of $f(x)$ increases rapidly till 2.5 and then slows down. The function yields invalid output for $x = 0$.

4.)Graph for $f(x) = x\ln(x)$:



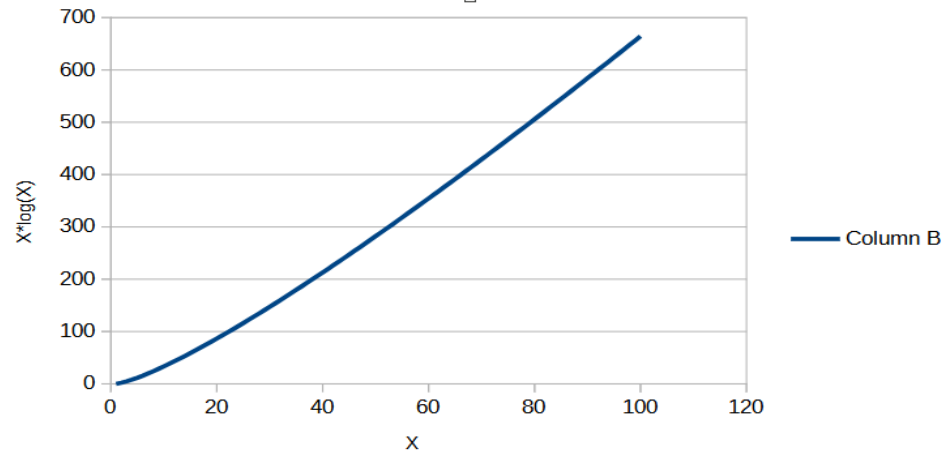
The nature of graph is similar to $f(x) = x$, but output values get higher due to the presence of $\ln(x)$ term when compared to $f(x) = x$. The function is not valid for $x = 0$.

5.)Graph for $f(x) = \log(x)$:



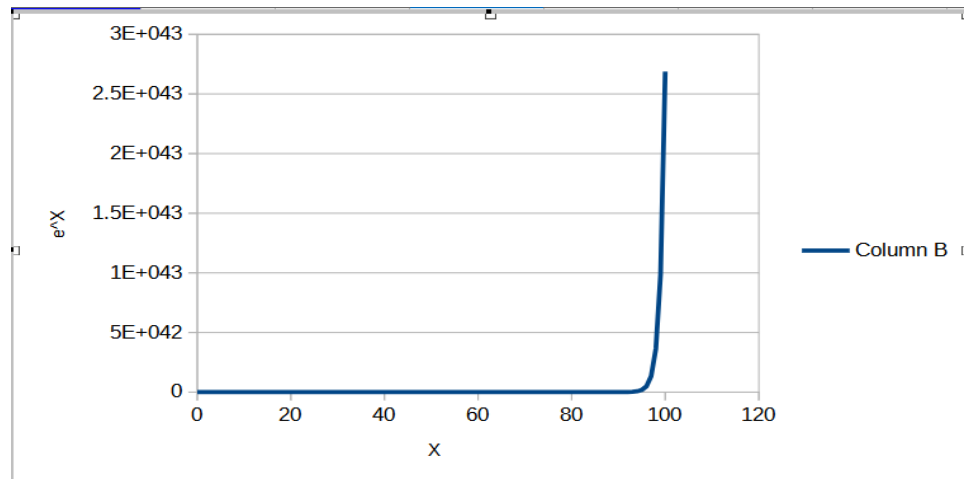
Initially the graph grows fast but slows down. i.e. after $x = 60$ the value of $f(x)$ increases very slowly with an increase in x . The function is invalid for $x = 0$.

6.)Graph for $f(x) = x \log(x)$:



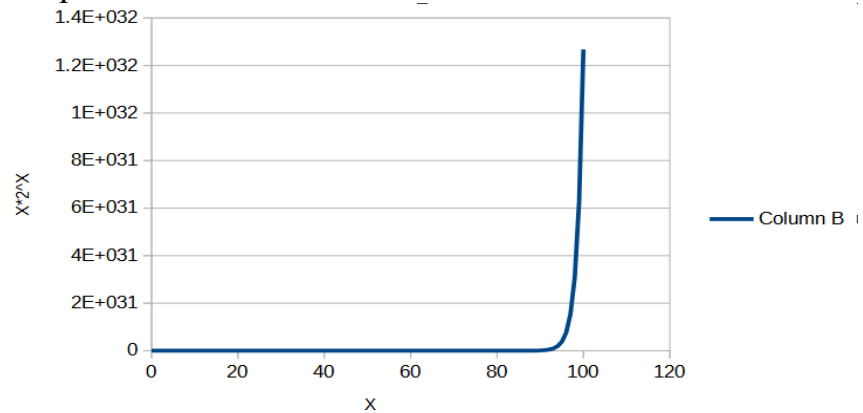
The graph is straight line but as x increases value of $f(x)$ increases rapidly. The function is not valid for $x = 0$.

7.)Graph for $f(x) = e^x$:



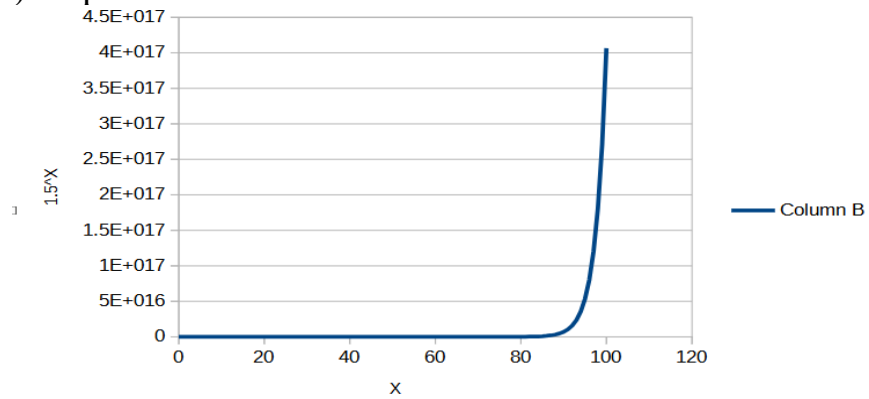
Looking at the graph it can be seen that even with small change in x there is drastic change in value of $f(x)$.

8.)Graph for $x \cdot 2^x$:



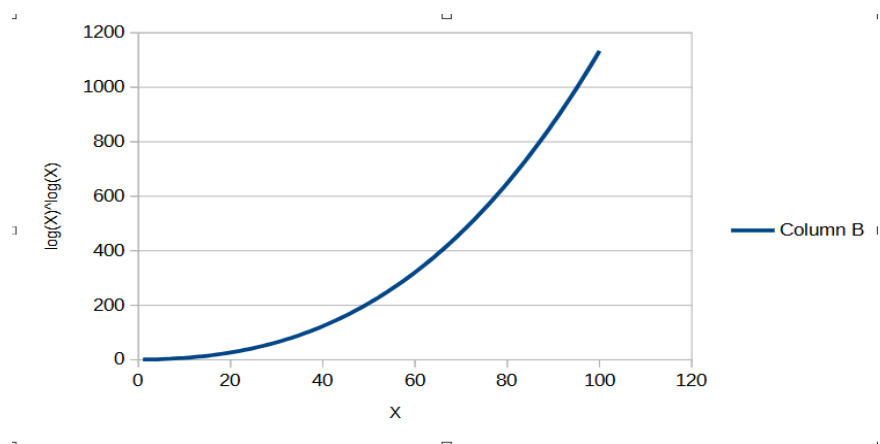
The value of $f(x)$ increase exponentially. As x increases $f(x)$ increases by huge amount.

9.)Graph for 1.5^x :



The value of $f(x)$ increase slowly till $x = 23$ but after $x > 23$ value of $f(x)$ increase rapidly.

10.)Graph for $\log(x)^{\log(x)}$:



The function is invalid for $x = 0$.

Outputs:

1.) $f(x) = x$

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30

31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61

61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

2.) $f(x) = x^3$

31	29791
32	32768
33	35937
34	39304
35	42875
36	46656
37	50653
38	54872
39	59319
40	64000
41	68921
42	74088
43	79507
44	85184
45	91125
46	97336
47	103823
48	110592
49	117649
50	125000
51	132651
52	140608
53	148877
54	157464
55	166375
56	175616
57	185193
58	195112
59	205379
60	216000
61	226981

31	29791
32	32768
33	35937
34	39304
35	42875
36	46656
37	50653
38	54872
39	59319
40	64000
41	68921
42	74088
43	79507
44	85184
45	91125
46	97336
47	103823
48	110592
49	117649
50	125000
51	132651
52	140608
53	148877
54	157464
55	166375
56	175616
57	185193
58	195112
59	205379
60	216000
61	226981

62	238328
63	250047
64	262144
65	274625
66	287496
67	300763
68	314432
69	328509
70	343000
71	357911
72	373248
73	389017
74	405224
75	421875
76	438976
77	456533
78	474552
79	493039
80	512000
81	531441
82	551368
83	571787
84	592704
85	614125
86	636056
87	658503
88	681472
89	704969
90	729000
91	753571
92	778688
93	804357
94	830584
95	857375
96	884736
97	912673
98	941192
99	970299
100	1000000

$$3.)f(x) = \ln(x)$$

0	
1	0
2	0.693147
3	1.098612
4	1.386294
5	1.609438
6	1.791759
7	1.94591
8	2.079442
9	2.197225
10	2.302585
11	2.397895
12	2.484907
13	2.564949
14	2.639057
15	2.70805
16	2.772589
17	2.833213
18	2.890372
19	2.944439
20	2.995732
21	3.044522
22	3.091042
23	3.135494
24	3.178054
25	3.218876
26	3.258097
27	3.295837
28	3.332205
29	3.367296
30	3.401197

31	3.433987
32	3.465736
33	3.496508
34	3.526361
35	3.555348
36	3.583519
37	3.610918
38	3.637586
39	3.663562
40	3.688879
41	3.713572
42	3.73767
43	3.7612
44	3.78419
45	3.806662
46	3.828641
47	3.850148
48	3.871201
49	3.89182
50	3.912023
51	3.931826
52	3.951244
53	3.970292
54	3.988984
55	4.007333
56	4.025352
57	4.043051
58	4.060443
59	4.077537
60	4.094345
61	4.110874

62	4.127134
63	4.143135
64	4.158883
65	4.174387
66	4.189655
67	4.204693
68	4.219508
69	4.234107
70	4.248495
71	4.26268
72	4.276666
73	4.290459
74	4.304065
75	4.317488
76	4.330733
77	4.343805
78	4.356709
79	4.369448
80	4.382027
81	4.394449
82	4.406719
83	4.418841
84	4.430817
85	4.442651
86	4.454347
87	4.465908
88	4.477337
89	4.488636
90	4.49981
91	4.51086
92	4.521789
93	4.532599
94	4.543295
95	4.553877
96	4.564348
97	4.574711
98	4.584967
99	4.59512
100	4.60517

$$4.)f(x) = x*\ln(x)$$

1	0
2	1.386294
3	3.295837
4	5.545177
5	8.04719
6	10.750557
7	13.621371
8	16.635532
9	19.775021
10	23.025851
11	26.376848
12	29.81888
13	33.344342
14	36.946803
15	40.620753
16	44.36142
17	48.164627
18	52.026692
19	55.944341
20	59.914645
21	63.934971
22	68.002934
23	72.116367
24	76.273292
25	80.471896
26	84.71051
27	88.987595
28	93.301726
29	97.651579
30	102.035921
31	106.453603

32	110.903549
33	115.38475
34	119.896258
35	124.437182
36	129.006682
37	133.603963
38	138.228274
39	142.878904
40	147.555178
41	152.256455
42	156.982124
43	161.731605
44	166.504344
45	171.299812
46	176.117504
47	180.956937
48	185.817649
49	190.699195
50	195.60115
51	200.523107
52	205.464673
53	210.425471
54	215.405139
55	220.403325
56	225.419695
57	230.453922
58	235.505695
59	240.574709
60	245.660674
61	250.763306
62	255.882332

63	261.017488
64	266.168517
65	271.335173
66	276.517213
67	281.714405
68	286.926524
69	292.153349
70	297.394667
71	302.650271
72	307.919961
73	313.203539
74	318.500817
75	323.811609
76	329.135734
77	334.473017
78	339.823288
79	345.18638
80	350.562131
81	355.950382
82	361.350978
83	366.76377
84	372.188611
85	377.625357
86	383.073867
87	388.534006
88	394.00564
89	399.488637
90	404.98287
91	410.488215
92	416.004549
93	421.531753
94	427.06971
95	432.618305
96	438.177426
97	443.746965
98	449.326813
99	454.916865
100	460.517019

5.)f(x) = log(x)

1	0
2	1
3	1.584963
4	2
5	2.321928
6	2.584963
7	2.807355
8	3
9	3.169925
10	3.321928
11	3.459432
12	3.584963
13	3.70044
14	3.807355
15	3.906891
16	4
17	4.087463
18	4.169925
19	4.247928
20	4.321928
21	4.392317
22	4.459432
23	4.523562
24	4.584963
25	4.643856
26	4.70044
27	4.754888
28	4.807355
29	4.857981
30	4.906891
31	4.954196
32	5
33	5.044394

34	5.087463
35	5.129283
36	5.169925
37	5.209453
38	5.247928
39	5.285402
40	5.321928
41	5.357552
42	5.392317
43	5.426265
44	5.459432
45	5.491853
46	5.523562
47	5.554589
48	5.584963
49	5.61471
50	5.643856
51	5.672425
52	5.70044
53	5.72792
54	5.754888
55	5.78136
56	5.807355
57	5.83289
58	5.857981
59	5.882643
60	5.906891
61	5.930737
62	5.954196
63	5.97728
64	6
65	6.022368
66	6.044394

67	6.066089
68	6.087463
69	6.108524
70	6.129283
71	6.149747
72	6.169925
73	6.189825
74	6.209453
75	6.228819
76	6.247928
77	6.266787
78	6.285402
79	6.303781
80	6.321928
81	6.33985
82	6.357552
83	6.375039
84	6.392317
85	6.409391
86	6.426265
87	6.442943
88	6.459432
89	6.475733
90	6.491853
91	6.507795
92	6.523562
93	6.539159
94	6.554589
95	6.569856
96	6.584963
97	6.599913
98	6.61471
99	6.629357
100	6.643856

6.)f(x) = x*log(x)

1	0
2	2
3	4.754888
4	8
5	11.60964
6	15.509775
7	19.651484
8	24
9	28.529325
10	33.219281
11	38.053748
12	43.01955
13	48.105716
14	53.302969
15	58.603359
16	64
17	69.486868
18	75.05865
19	80.710623
20	86.438562
21	92.238666
22	98.107496
23	104.041925
24	110.0391
25	116.096405
26	122.211433
27	128.381963
28	134.605938
29	140.881449
30	147.206718
31	153.580086
32	160
33	166.465006
34	172.973737
35	179.524906
36	186.1173

37	192.749775
38	199.421246
39	206.130687
40	212.877124
41	219.659632
42	226.477332
43	233.329384
44	240.214991
45	247.133389
46	254.08385
47	261.065676
48	268.0782
49	275.120782
50	282.192809
51	289.293692
52	296.422865
53	303.579784
54	310.763925
55	317.974784
56	325.211876
57	332.474731
58	339.762898
59	347.07594
60	354.413436
61	361.774978
62	369.160171
63	376.568635
64	384
65	391.453908
66	398.930012
67	406.427976
68	413.947473
69	421.488188
70	429.049811
71	436.632045
72	444.2346

73	451.857193
74	459.499549
75	467.161402
76	474.842491
77	482.542564
78	490.261373
79	497.998679
80	505.754248
81	513.52785
82	521.319264
83	529.128273
84	536.954664
85	544.79823
86	552.658769
87	560.536084
88	568.429982
89	576.340275
90	584.266779
91	592.209312
92	600.1677
93	608.141769
94	616.131352
95	624.136283
96	632.1564
97	640.191546
98	648.241565
99	656.306305
100	664.385619

$$7.)f(x) = e^x$$

0	1
1	2.718282
2	7.389056
3	20.085537
4	54.59815
5	148.413159
6	403.428793
7	1096.633158
8	2980.957987
9	8103.083928
10	22026.4658
11	59874.14172
12	162754.7914
13	442413.392
14	1202604.284
15	3269017.372
16	8886110.521
17	24154952.75
18	65659969.14
19	178482301
20	485165195.4
21	1318815734
22	3584912846
23	9744803446
24	26489122130
25	72004899337
26	1.9573E+11
27	5.32048E+11
28	1.44626E+12
29	3.93133E+12
30	1.06865E+13
31	2.90488E+13
32	7.8963E+13
33	2.14644E+14
34	5.83462E+14
35	1.58601E+15

36	4.31123E+15
37	1.17191E+16
38	3.18559E+16
39	8.65934E+16
40	2.35385E+17
41	6.39843E+17
42	1.73927E+18
43	4.72784E+18
44	1.28516E+19
45	3.49343E+19
46	9.49612E+19
47	2.58131E+20
48	7.01674E+20
49	1.90735E+21
50	5.18471E+21
51	1.40935E+22
52	3.83101E+22
53	1.04138E+23
54	2.83075E+23
55	7.69479E+23
56	2.09166E+24
57	5.68572E+24
58	1.54554E+25
59	4.20121E+25
60	1.14201E+26
61	3.1043E+26
62	8.43836E+26
63	2.29378E+27
64	6.23515E+27
65	1.69489E+28
66	4.60719E+28
67	1.25236E+29
68	3.40428E+29
69	9.25378E+29
70	2.51544E+30
71	6.83767E+30

72	1.85867E+31
73	5.05239E+31
74	1.37338E+32
75	3.73324E+32
76	1.0148E+33
77	2.75851E+33
78	7.49842E+33
79	2.03828E+34
80	5.54062E+34
81	1.5061E+35
82	4.094E+35
83	1.11286E+36
84	3.02508E+36
85	8.22301E+36
86	2.23525E+37
87	6.07603E+37
88	1.65164E+38
89	4.48961E+38
90	1.2204E+39
91	3.3174E+39
92	9.01763E+39
93	2.45125E+40
94	6.66318E+40
95	1.81124E+41
96	4.92346E+41
97	1.33833E+42
98	3.63797E+42
99	9.88903E+42
100	2.68812E+43

$$8.)f(x) = x \cdot 2^x$$

0	0
1	2
2	8
3	24
4	64
5	160
6	384
7	896
8	2048
9	4608
10	10240
11	22528
12	49152
13	106496
14	229376
15	491520
16	1048576
17	2228224
18	4718592
19	9961472
20	20971520
21	44040192
22	92274688
23	192937984
24	402653184
25	838860800
26	1744830464
27	3623878656
28	7516192768
29	15569256448
30	32212254720
31	66571993088
32	1.37439E+11

33	2.83468E+11
34	5.84116E+11
35	1.20259E+12
36	2.4739E+12
37	5.08524E+12
38	1.04454E+13
39	2.14405E+13
40	4.39805E+13
41	9.016E+13
42	1.84718E+14
43	3.78232E+14
44	7.74056E+14
45	1.5833E+15
46	3.23696E+15
47	6.61466E+15
48	1.35108E+16
49	2.75845E+16
50	5.6295E+16
51	1.14842E+17
52	2.34187E+17
53	4.77382E+17
54	9.72778E+17
55	1.98158E+18
56	4.03523E+18
57	8.21457E+18
58	1.67174E+19
59	3.40112E+19
60	6.91753E+19
61	1.40656E+20
62	2.85925E+20
63	5.81072E+20
64	1.18059E+21
65	2.39808E+21

66	4.86994E+21
67	9.88745E+21
68	2.00701E+22
69	4.07304E+22
70	8.26414E+22
71	1.67644E+23
72	3.4001E+23
73	6.89466E+23
74	1.39782E+24
75	2.83342E+24
76	5.7424E+24
77	1.16359E+25
78	2.35741E+25
79	4.77526E+25
80	9.67141E+25
81	1.95846E+26
82	3.96528E+26
83	8.02727E+26
84	1.6248E+27
85	3.28828E+27
86	6.65393E+27
87	1.34626E+28
88	2.72347E+28
89	5.50883E+28
90	1.11415E+29
91	2.25305E+29
92	4.55562E+29
93	9.21027E+29
94	1.86186E+30
95	3.76334E+30
96	7.6059E+30
97	1.53703E+31
98	3.10574E+31
99	6.27487E+31
100	1.26765E+32

$$9.)f(x) = 1.5^x$$

0	1
1	1.5
2	2.25
3	3.38
4	5.06
5	7.59
6	11.39
7	17.09
8	25.63
9	38.44
10	57.67
11	86.5
12	129.75
13	194.62
14	291.93
15	437.89
16	656.84
17	985.26
18	1477.89
19	2216.84
20	3325.26
21	4987.89
22	7481.83
23	11222.74
24	16834.11
25	25251.17
26	37876.75
27	56815.13
28	85222.69
29	127834.04
30	191751.06
31	287626.59
32	431439.88

33	647159.82
34	970739.74
35	1456109.61
36	2184164.41
37	3276246.61
38	4914369.92
39	7371554.88
40	11057332.32
41	16585998.48
42	24878997.72
43	37318496.58
44	55977744.87
45	83966617.31
46	125949926
47	188924889
48	283387333.4
49	425081000.1
50	637621500.2
51	956432250.3
52	1434648375
53	2151972563
54	3227958845
55	4841938267
56	7262907401
57	10894361101
58	16341541652
59	24512312478
60	36768468717
61	55152703075
62	82729054613
63	1.24094E+11
64	1.8614E+11
65	2.79211E+11

66	4.18816E+11
67	6.28224E+11
68	9.42336E+11
69	1.4135E+12
70	2.12026E+12
71	3.18038E+12
72	4.77057E+12
73	7.15586E+12
74	1.07338E+13
75	1.61007E+13
76	2.4151E+13
77	3.62265E+13
78	5.43398E+13
79	8.15097E+13
80	1.22265E+14
81	1.83397E+14
82	2.75095E+14
83	4.12643E+14
84	6.18965E+14
85	9.28447E+14
86	1.39267E+15
87	2.08901E+15
88	3.13351E+15
89	4.70026E+15
90	7.05039E+15
91	1.05756E+16
92	1.58634E+16
93	2.37951E+16
94	3.56926E+16
95	5.35389E+16
96	8.03084E+16
97	1.20463E+17
98	1.80694E+17
99	2.71041E+17
100	4.06561E+17

$$10.)f(x) = \log(x)^{\log(x)}$$

1	1
2	0.775655
3	1.108849
4	1.572727
5	2.150945
6	2.843258
7	3.652641
8	4.583018
9	5.638647
10	6.823897
11	8.143162
12	9.600827
13	11.201247
14	12.948743
15	14.847594
16	16.902043
17	19.116293
18	21.494511
19	24.040828
20	26.759341
21	29.654117
22	32.729191
23	35.988571
24	39.436238
25	43.076147
26	46.912229
27	50.948391
28	55.188521
29	59.636484
30	64.296126
31	69.171276
32	74.265742
33	79.583318
34	85.12778
35	90.90289

36	96.912394
37	103.160025
38	109.6495
39	116.384528
40	123.3688
41	130.605998
42	138.099793
43	145.853843
44	153.871797
45	162.157293
46	170.713961
47	179.545418
48	188.655276
49	198.047135
50	207.724588
51	217.691219
52	227.950606
53	238.506318
54	249.361916
55	260.520955
56	271.986984
57	283.763542
58	295.854165
59	308.262381
60	320.991713
61	334.045678
62	347.427786
63	361.141543
64	375.190449
65	389.577999
66	404.307683
67	419.382987
68	434.80739
69	450.584369
70	466.717394
71	483.209934

72	500.065451
73	517.287404
74	534.879249
75	552.844435
76	571.18641
77	589.908619
78	609.014501
79	628.507493
80	648.391029
81	668.668539
82	689.34345
83	710.419185
84	731.899167
85	753.786813
86	776.085538
87	798.798755
88	821.929874
89	845.482302
90	869.459444
91	893.864701
92	918.701475
93	943.973162
94	969.683158
95	995.834856
96	1022.431647
97	1049.476919
98	1076.974059
99	1104.926452
100	1133.337481

PROGRAM:

```
#include<math.h>
#include<stdio.h>
void func1(){
for(int i=0;i<=100;i++){
    printf("%d\n",i);
}
for(int i=0;i<=100;i++){
    double x = 1.5;
    double val = pow(x,i);
    printf("%.2f\n",val);
}
}
void func2(){
for(int i=0;i<=100;i++){
    printf("%d\n",i);
}
}
void func3(){
for(int i=0;i<=100;i++){
    int val = i*i*i;
    printf("%d\n",val);
}
}
void func4(){
for(int i=0;i<=100;i++){
    double val = i * pow(2,i);
    printf("%lf\n",val);
}
}
void func5(){
for(int i=0;i<=100;i++){
    if(i == 0)
        continue;
    double val = log2(i);
```

```
    printf("%lf\n",val);
}

}

void func6(){
for(int i=0;i<=100;i++){
    if(i == 0)
        continue;
    double val = pow(log(i),log(i));
    printf("%lf\n",val);
}
}

void func7(){
for(int i=0;i<=100;i++){
    if(i == 0)
        continue;
    double val = i * log2(i);
    printf("%lf\n", val);
}
}

void func8(){
for(int i=0;i<=100;i++){
    printf("%lf\n", exp(i));
}
}

void func9(){
    for(int i=0;i<=100;i++){
        if(i == 0)
            continue;
        double val = log(i);
        printf("%lf\n", val);
    }
}

void func10(){
```

	<pre>for(int i=0;i<=100;i++){ if(i == 0) continue; double val = i * log(i); printf("%lf\n", val); } }</pre>
CONCLUSION:	<p>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.</p>