NAME:	Eshan Bhuse
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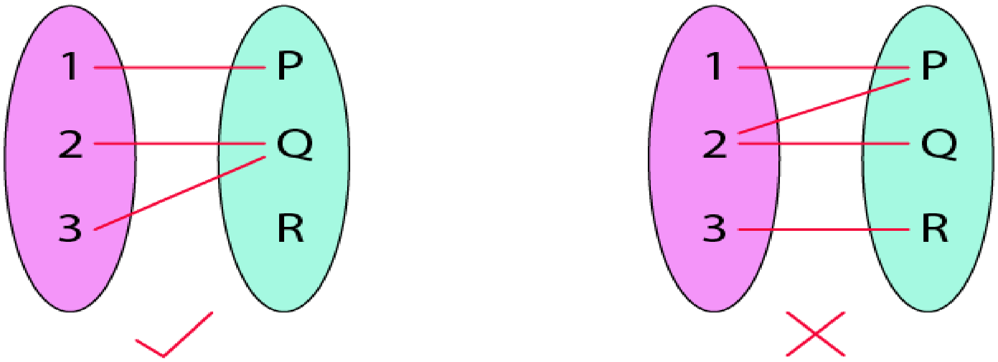
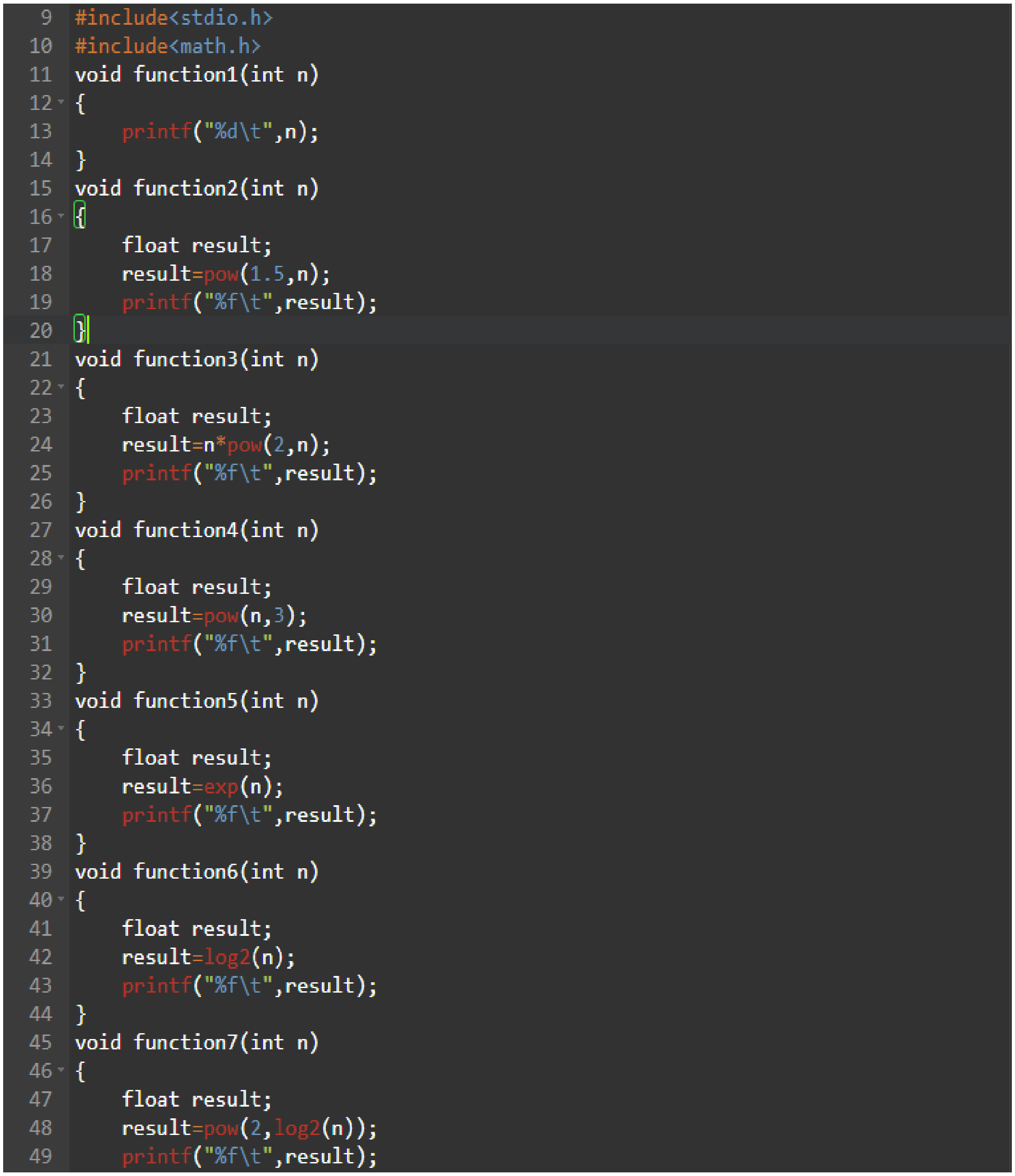
SUBJECT	Design and Analysis of Algorithm
EXPERIMENT NO :	1
DATE OF PERFORMANCE	23/01/2023
DATE OF SUBMISSION	08/2/2023
AIM:	**To implement various functions eg: linear, non-linear, quadratic and exponential**.
PROBLEM STATEMENT 1:	**For this experiment, you have to implement at least 10 functions from the following list.**
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.  1 2 3 P Q R ✓ 1 2 3 P Q R ✗

ALGORITHM:	Step 1: Start. Step 2: Declare the variables which are required to perform operations on the functions. Step 3: Start the loop which starts from 0th number to 100th number. Step 4: i. Perform the operation: n ii. Print the result. Step 5: i. Perform the operation: 1.5^n ii. Print the result. Step 6: i. Perform the operation: n*(2^n) ii. Print the result. Step 7: i. Perform the operation: n^3 ii. Print the result. Step 8: i. Perform the operation: e^n ii. Print the result. Step 9: i. Perform the operation: log2(n) ii. Print the result. Step 10: i. Perform the operation: 2^log2(n) ii. Print the result. Step 11: i. Perform the operation: n*log2(n) ii. Print the result. Step 12: i. Perform the operation: log(n) ii. Print the result. Step 13: i. Perform the operation: 2^log(n) ii. Print the result.

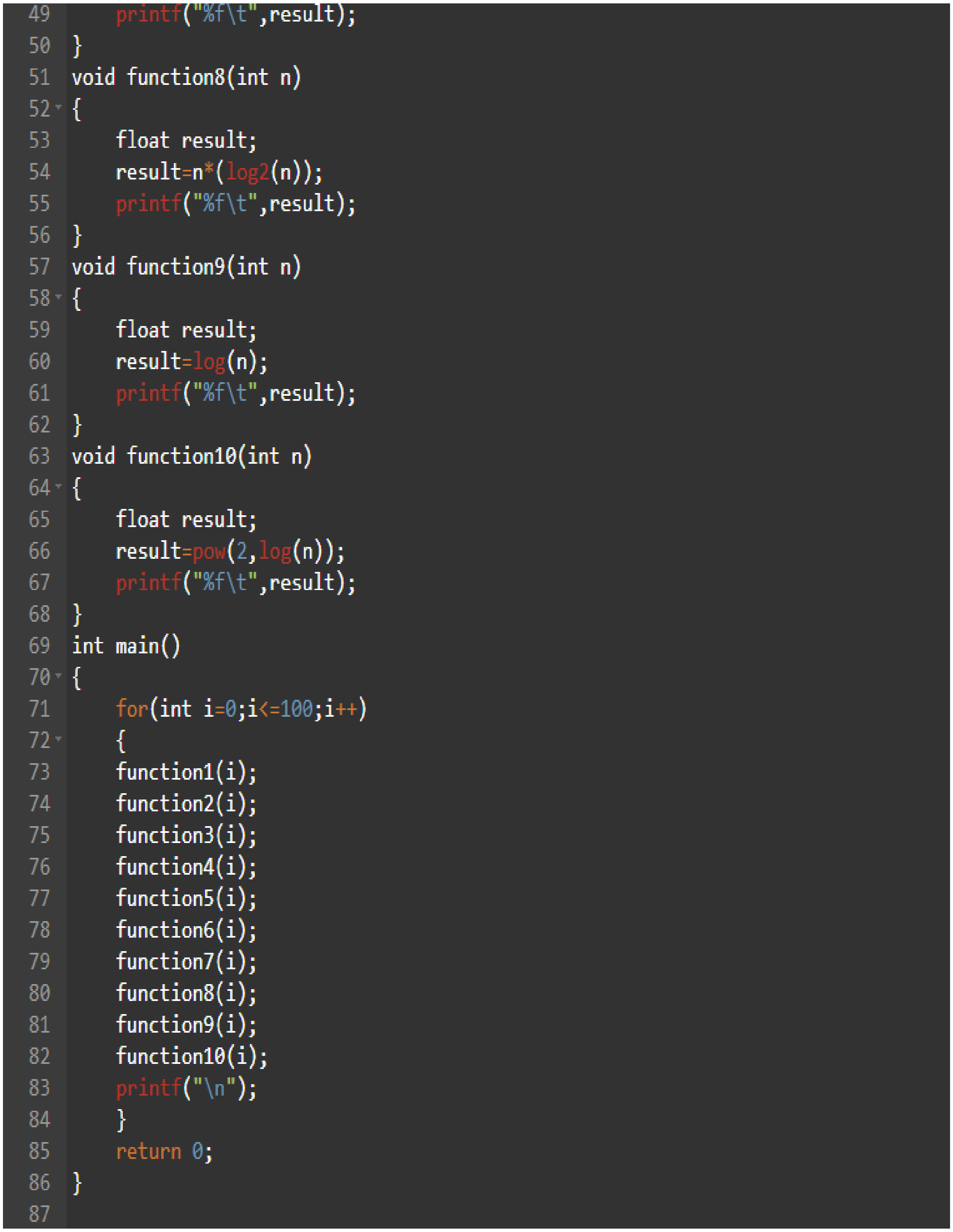
Step 14: End the loop

Step 15: End.

PROGRAM:



```c
#include<stdio.h>
#include<math.h>
void function1(int n)
{
    printf("%d\t",n);
}
void function2(int n)
{
    float result;
    result=pow(1.5,n);
    printf("%f\t",result);
}
void function3(int n)
{
    float result;
    result=n*pow(2,n);
    printf("%f\t",result);
}
void function4(int n)
{
    float result;
    result=pow(n,3);
    printf("%f\t",result);
}
void function5(int n)
{
    float result;
    result=exp(n);
    printf("%f\t",result);
}
void function6(int n)
{
    float result;
    result=log2(n);
    printf("%f\t",result);
}
void function7(int n)
{
    float result;
    result=pow(2,log2(n));
    printf("%f\t",result);
```



```c
    printf("%f\t",result);
}
void function8(int n)
{
    float result;
    result=n*(log2(n));
    printf("%f\t",result);
}
void function9(int n)
{
    float result;
    result=log(n);
    printf("%f\t",result);
}
void function10(int n)
{
    float result;
    result=pow(2,log(n));
    printf("%f\t",result);
}
int main()
{
    for(int i=0;i<=100;i++)
    {
    function1(i);
    function2(i);
    function3(i);
    function4(i);
    function5(i);
    function6(i);
    function7(i);
    function8(i);
    function9(i);
    function10(i);
    printf("\n");
    }
    return 0;
}

```

OBSERVATION:

n	1.5^n	n*(2^n)	n^3	e^n	log2(n)	2^log2(n)	n*log2(n)	log(n)	2^log(n)
0	1	0	0	1	#NUM!	0	#NUM!	#NUM!	#NUM!
1	1.5	2	1	2.718282	0	1	0	0	1
2	2.25	8	8	7.389056	1	2	2	0.693147	1.616807
3	3.375	24	27	20.08554	1.584963	3	4.754888	1.098612	2.141486
4	5.0625	64	64	54.59815	2	4	8	1.386294	2.614064
5	7.59375	160	125	148.4132	2.321928	5	11.60964	1.609438	3.051329
6	11.39063	384	216	403.4288	2.584963	6	15.50978	1.791759	3.462369
7	17.08594	896	343	1096.633	2.807355	7	19.65148	1.94591	3.852808
8	25.62891	2048	512	2980.958	3	8	24	2.079442	4.226436
9	38.44336	4608	729	8103.084	3.169925	9	28.52933	2.197225	4.585963
10	57.66504	10240	1000	22026.47	3.321928	10	33.21928	2.302585	4.93341
11	86.49756	22528	1331	59874.14	3.459432	11	38.05375	2.397895	5.270337
12	129.7463	49152	1728	162754.8	3.584963	12	43.01955	2.484907	5.597981
13	194.6195	106496	2197	442413.4	3.70044	13	48.10572	2.564949	5.917342
14	291.9293	229376	2744	1202604	3.807355	14	53.30297	2.639057	6.229245
15	437.8939	491520	3375	3269017	3.906891	15	58.60336	2.70805	6.534379
16	656.8408	1048576	4096	8886111	4	16	64	2.772589	6.83333
17	985.2613	2228224	4913	24154953	4.087463	17	69.48687	2.833213	7.126597
18	1477.892	4718592	5832	65659969	4.169925	18	75.05865	2.890372	7.414615
19	2216.838	9961472	6859	1.78E+08	4.247928	19	80.71062	2.944439	7.697762
20	3325.257	20971520	8000	4.85E+08	4.321928	20	86.43856	2.995732	7.97637

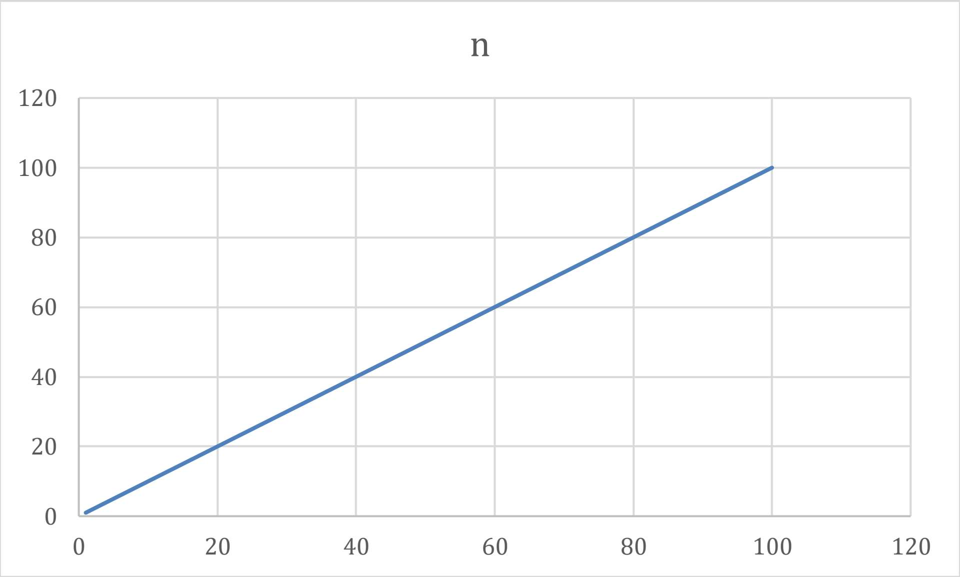
	21	4987.885	44040192	9261	1.32E+09	4.392317	21	92.23867	3.044522	8.250734
	22	7481.828	92274688	10648	3.58E+09	4.459432	22	98.1075	3.091042	8.521116
	23	11222.74	1.93E+08	12167	9.74E+09	4.523562	23	104.0419	3.135494	8.787752
	24	16834.11	4.03E+08	13824	2.65E+10	4.584963	24	110.0391	3.178054	9.050853
	25	25251.17	8.39E+08	15625	7.2E+10	4.643856	25	116.0964	3.218876	9.310611
	26	37876.75	1.74E+09	17576	1.96E+11	4.70044	26	122.2114	3.258097	9.567199
	27	56815.13	3.62E+09	19683	5.32E+11	4.754888	27	128.382	3.295837	9.820775
	28	85222.69	7.52E+09	21952	1.45E+12	4.807355	28	134.6059	3.332205	10.07148
	29	127834	1.56E+10	24389	3.93E+12	4.857981	29	140.8814	3.367296	10.31946
	30	191751.1	3.22E+10	27000	1.07E+13	4.906891	30	147.2067	3.401197	10.56483
	31	287626.6	6.66E+10	29791	2.9E+13	4.954196	31	153.5801	3.433987	10.8077
	32	431439.9	1.37E+11	32768	7.9E+13	5	32	160	3.465736	11.04817
	33	647159.8	2.83E+11	35937	2.15E+14	5.044394	33	166.465	3.496508	11.28635
	34	970739.7	5.84E+11	39304	5.83E+14	5.087463	34	172.9737	3.526361	11.52233
	35	1456110	1.2E+12	42875	1.59E+15	5.129283	35	179.5249	3.555348	11.75618
	36	2184164	2.47E+12	46656	4.31E+15	5.169925	36	186.1173	3.583519	11.988
	37	3276247	5.09E+12	50653	1.17E+16	5.209453	37	192.7498	3.610918	12.21784
	38	4914370	1.04E+13	54872	3.19E+16	5.247928	38	199.4212	3.637586	12.44579
	39	7371555	2.14E+13	59319	8.66E+16	5.285402	39	206.1307	3.663562	12.67191
	40	11057332	4.4E+13	64000	2.35E+17	5.321928	40	212.8771	3.688879	12.89625
	41	16585998	9.02E+13	68921	6.4E+17	5.357552	41	219.6596	3.713572	13.11887
	42	24878998	1.85E+14	74088	1.74E+18	5.392317	42	226.4773	3.73767	13.33984
	43	37318497	3.78E+14	79507	4.73E+18	5.426265	43	233.3294	3.7612	13.5592

	44	55977745	7.74E+14	85184	1.29E+19	5.459432	44	240.215	3.78419	13.777
	45	83966617	1.58E+15	91125	3.49E+19	5.491853	45	247.1334	3.806662	13.99328
	46	1.26E+08	3.24E+15	97336	9.5E+19	5.523562	46	254.0838	3.828641	14.2081
	47	1.89E+08	6.61E+15	103823	2.58E+20	5.554589	47	261.0657	3.850148	14.42148
	48	2.83E+08	1.35E+16	110592	7.02E+20	5.584963	48	268.0782	3.871201	14.63348
	49	4.25E+08	2.76E+16	117649	1.91E+21	5.61471	49	275.1208	3.89182	14.84413
	50	6.38E+08	5.63E+16	125000	5.18E+21	5.643856	50	282.1928	3.912023	15.05346
	51	9.56E+08	1.15E+17	132651	1.41E+22	5.672425	51	289.2937	3.931826	15.26151
	52	1.43E+09	2.34E+17	140608	3.83E+22	5.70044	52	296.4229	3.951244	15.46831
	53	2.15E+09	4.77E+17	148877	1.04E+23	5.72792	53	303.5798	3.970292	15.6739
	54	3.23E+09	9.73E+17	157464	2.83E+23	5.754888	54	310.7639	3.988984	15.87829
	55	4.84E+09	1.98E+18	166375	7.69E+23	5.78136	55	317.9748	4.007333	16.08153
	56	7.26E+09	4.04E+18	175616	2.09E+24	5.807355	56	325.2119	4.025352	16.28364
	57	1.09E+10	8.21E+18	185193	5.69E+24	5.83289	57	332.4747	4.043051	16.48465
	58	1.63E+10	1.67E+19	195112	1.55E+25	5.857981	58	339.7629	4.060443	16.68457
	59	2.45E+10	3.4E+19	205379	4.2E+25	5.882643	59	347.0759	4.077537	16.88345
	60	3.68E+10	6.92E+19	216000	1.14E+26	5.906891	60	354.4134	4.094345	17.08128
	61	5.52E+10	1.41E+20	226981	3.1E+26	5.930737	61	361.775	4.110874	17.27811
	62	8.27E+10	2.86E+20	238328	8.44E+26	5.954196	62	369.1602	4.127134	17.47396
	63	1.24E+11	5.81E+20	250047	2.29E+27	5.97728	63	376.5686	4.143135	17.66883
	64	1.86E+11	1.18E+21	262144	6.24E+27	6	64	384	4.158883	17.86276
	65	2.79E+11	2.4E+21	274625	1.69E+28	6.022368	65	391.4539	4.174387	18.05576
	66	4.19E+11	4.87E+21	287496	4.61E+28	6.044394	66	398.93	4.189655	18.24785

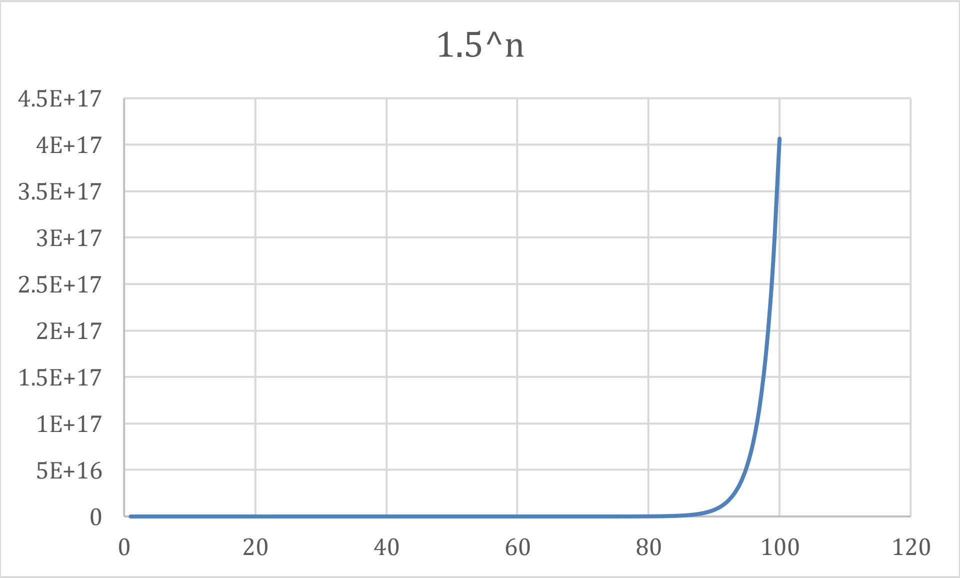
	67	6.28E+11	9.89E+21	300763	1.25E+29	6.066089	67	406.428	4.204693	18.43905
	68	9.42E+11	2.01E+22	314432	3.4E+29	6.087463	68	413.9475	4.219508	18.62938
	69	1.41E+12	4.07E+22	328509	9.25E+29	6.108524	69	421.4882	4.234107	18.81885
	70	2.12E+12	8.26E+22	343000	2.52E+30	6.129283	70	429.0498	4.248495	19.00748
	71	3.18E+12	1.68E+23	357911	6.84E+30	6.149747	71	436.632	4.26268	19.19528
	72	4.77E+12	3.4E+23	373248	1.86E+31	6.169925	72	444.2346	4.276666	19.38228
	73	7.16E+12	6.89E+23	389017	5.05E+31	6.189825	73	451.8572	4.290459	19.56848
	74	1.07E+13	1.4E+24	405224	1.37E+32	6.209453	74	459.4995	4.304065	19.75389
	75	1.61E+13	2.83E+24	421875	3.73E+32	6.228819	75	467.1614	4.317488	19.93854
	76	2.42E+13	5.74E+24	438976	1.01E+33	6.247928	76	474.8425	4.330733	20.12244
	77	3.62E+13	1.16E+25	456533	2.76E+33	6.266787	77	482.5426	4.343805	20.3056
	78	5.43E+13	2.36E+25	474552	7.5E+33	6.285402	78	490.2614	4.356709	20.48802
	79	8.15E+13	4.78E+25	493039	2.04E+34	6.303781	79	497.9987	4.369448	20.66973
	80	1.22E+14	9.67E+25	512000	5.54E+34	6.321928	80	505.7542	4.382027	20.85074
	81	1.83E+14	1.96E+26	531441	1.51E+35	6.33985	81	513.5279	4.394449	21.03105
	82	2.75E+14	3.97E+26	551368	4.09E+35	6.357552	82	521.3193	4.406719	21.21068
	83	4.13E+14	8.03E+26	571787	1.11E+36	6.375039	83	529.1283	4.418841	21.38964
	84	6.19E+14	1.62E+27	592704	3.03E+36	6.392317	84	536.9547	4.430817	21.56794
	85	9.28E+14	3.29E+27	614125	8.22E+36	6.409391	85	544.7982	4.442651	21.74559
	86	1.39E+15	6.65E+27	636056	2.24E+37	6.426265	86	552.6588	4.454347	21.9226
	87	2.09E+15	1.35E+28	658503	6.08E+37	6.442943	87	560.5361	4.465908	22.09898
	88	3.13E+15	2.72E+28	681472	1.65E+38	6.459432	88	568.43	4.477337	22.27474
	89	4.7E+15	5.51E+28	704969	4.49E+38	6.475733	89	576.3403	4.488636	22.44989

90	7.05E+15	1.11E+29	729000	1.22E+39	6.491853	90	584.2668	4.49981	22.62443
91	1.06E+16	2.25E+29	753571	3.32E+39	6.507795	91	592.2093	4.51086	22.79838
92	1.59E+16	4.56E+29	778688	9.02E+39	6.523562	92	600.1677	4.521789	22.97175
93	2.38E+16	9.21E+29	804357	2.45E+40	6.539159	93	608.1418	4.532599	23.14453
94	3.57E+16	1.86E+30	830584	6.66E+40	6.554589	94	616.1314	4.543295	23.31675
95	5.35E+16	3.76E+30	857375	1.81E+41	6.569856	95	624.1363	4.553877	23.48841
96	8.03E+16	7.61E+30	884736	4.92E+41	6.584963	96	632.1564	4.564348	23.65951
97	1.2E+17	1.54E+31	912673	1.34E+42	6.599913	97	640.1915	4.574711	23.83006
98	1.81E+17	3.11E+31	941192	3.64E+42	6.61471	98	648.2416	4.584967	24.00008
99	2.71E+17	6.27E+31	970299	9.89E+42	6.629357	99	656.3063	4.59512	24.16957
100	4.07E+17	1.27E+32	1000000	2.69E+43	6.643856	100	664.3856	4.60517	24.33853

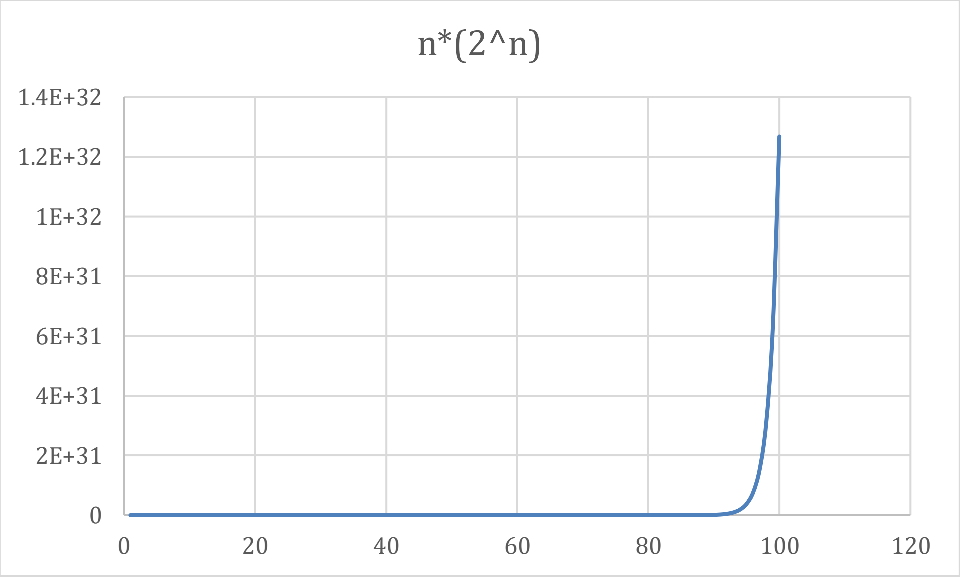
OBSERVATION TABLE:



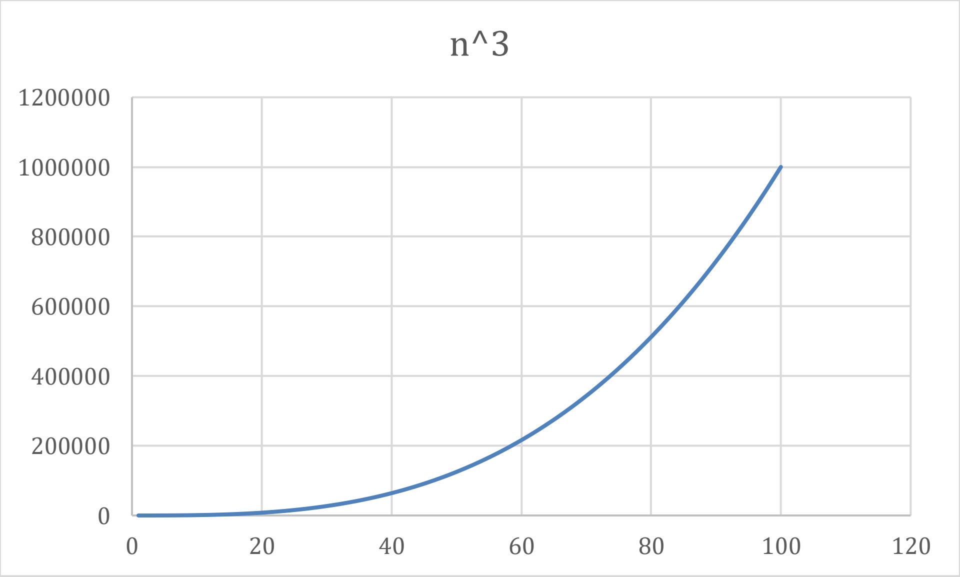
Here, the graph is a straight line since the input values are constantly increasing.



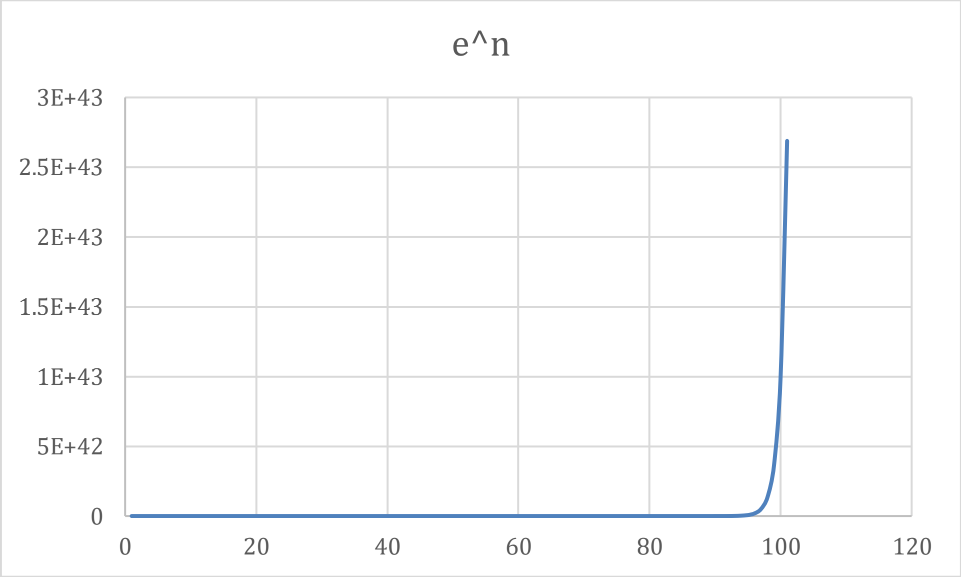
Here, the graph is constantly increasing but since the scale is large so it is negligible and after a given value the graph increases exponentially.



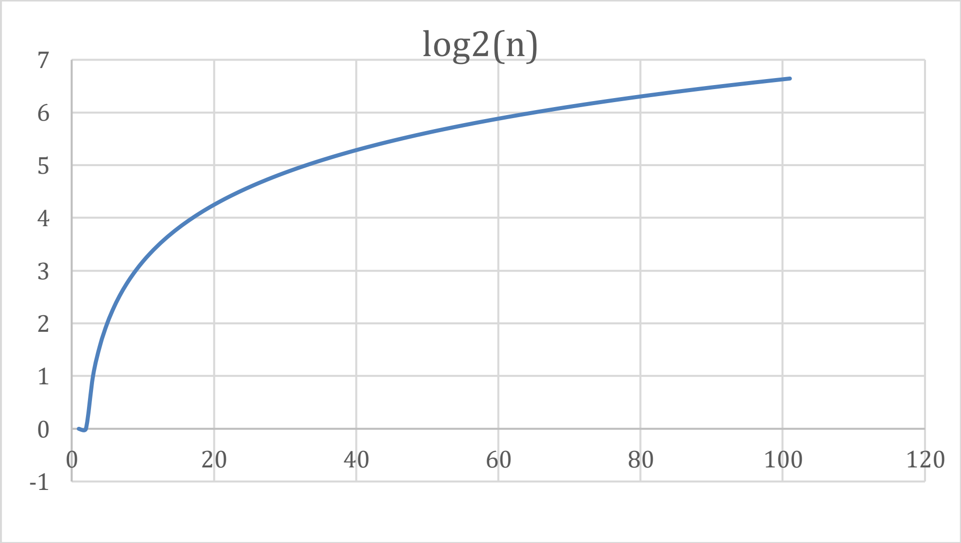
Here, the graph is constantly increasing but since the scale is large so it is negligible and after a given value the graph increases exponentially.



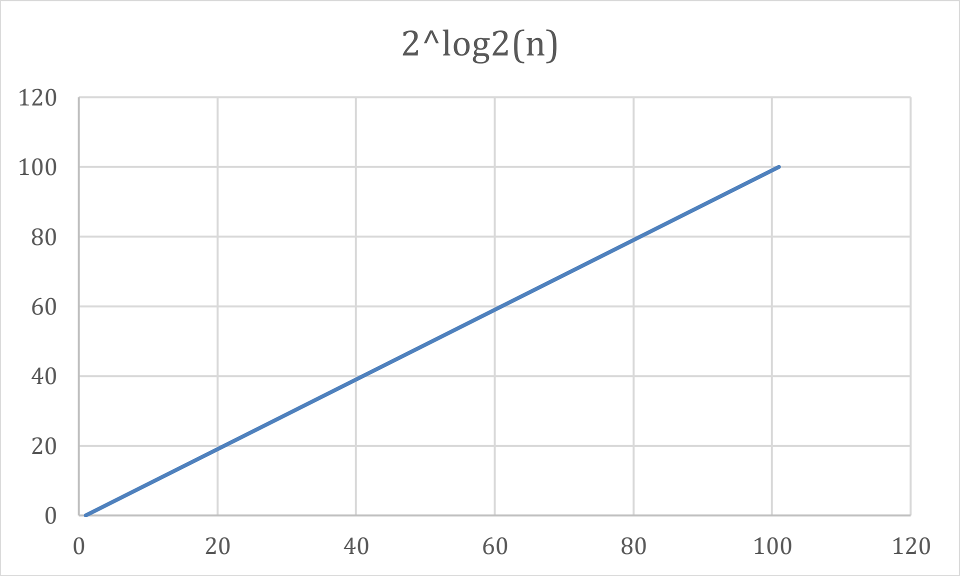
Here, the graph increases exponentially for origin to last number.



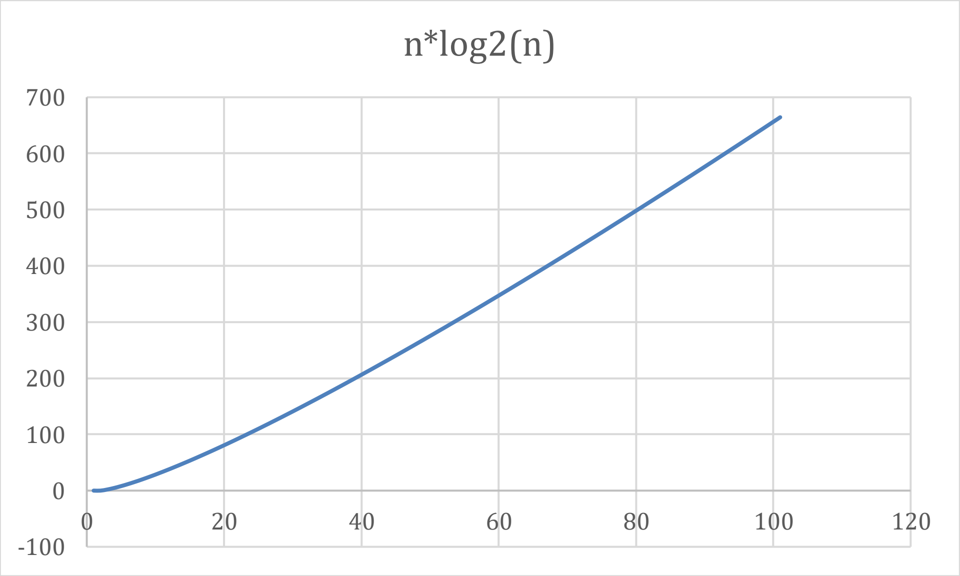
Here, the graph is constantly increasing but since the scale is large so it is negligible and after a given value the graph increases exponentially and its x-axis remains constant.



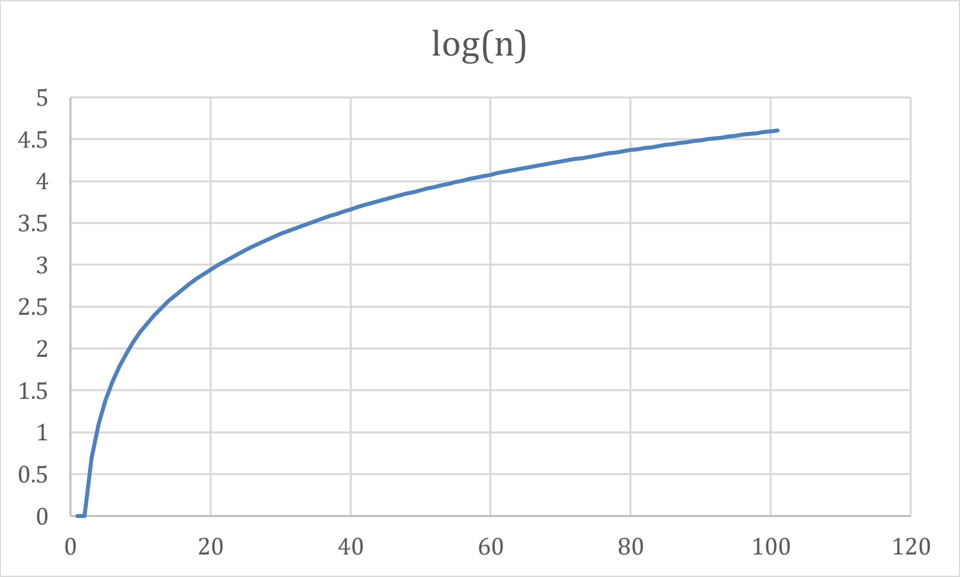
The graph is exponential and it increases with x-axis in a straight line after a given point.



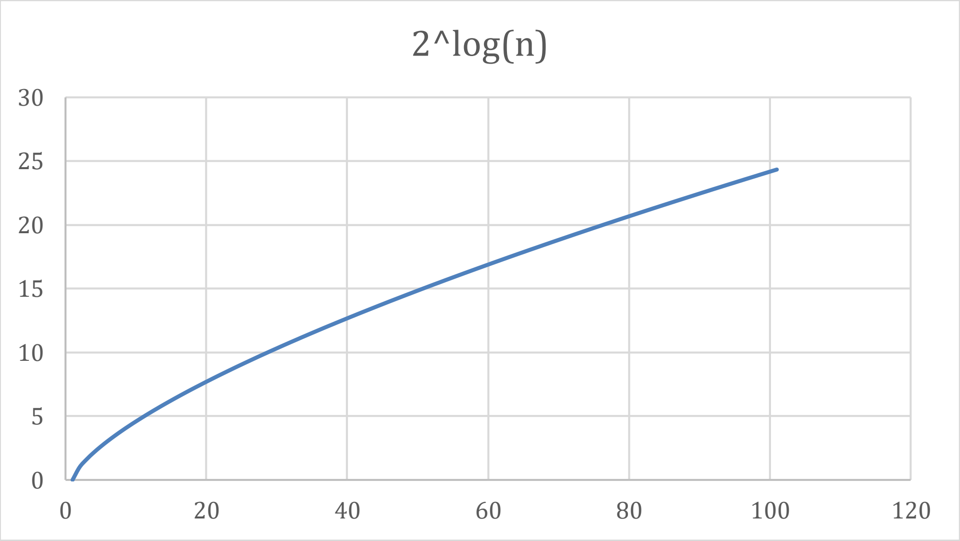
Here, the graph is a straight line since the input values are constantly increasing.



Here, there is near about linear growth but not actually linear growth there is little bit tilt in this graph.



Here, the graph is an exponential graph.



Here, at first graph increases exponentially but after a given point it is almost linear.

CONCLUSION:	Successfully performed the experiment of implementing any 10 mathematical functions in C Language and plot the graph in Excel sheet and also learned how to draw the graph in Excel sheet.