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| SUBJECT | Design and Analysis of Algorithm |
| EXPERIMENT NO : | 1A |
| AIM: | To implement the various functions e.g. linear, non-linear, quadratic, exponential etc |
| ALGORITHM: | <p>Algorithm for 10 functions for the numbers 0 to 100:</p> <p>Step 1: Start.</p> <p>Step 2: Declare the variables which are required to perform operations on the functions.</p> <p>Step 3: Start the loop which starts from 0th number to 100th number.</p> <p>Step 4: i. perform the operation: $3/2^n$ ii. Print the result.</p> <p>Step 5: i. Perform the operation: n^3 ii. Print the result.</p> <p>Step 6: i. Perform the operation: $n.\lg(n)$ ii. Print the result.</p> <p>Step 7: i. Perform the operation: $\lg(n)$ ii. Print the result.</p> <p>Step 8: i. Perform the operation: $2^{\lg(n)}$ ii. Print the result.</p> <p>Step 9: i. Perform the operation</p> |

$\lg(\lg(n))$

ii. Print the result.

Step 10: i. Perform the operation:

$\lg(n)^2$

ii. Print the result.

Step 11: i. Perform the operation:

n

ii. Print the result.

Step 12: i. Perform the operation:

$\ln(\ln(n))$

ii. Print the result.

Step 13: i. Perform the operation:

$n.2^n$

ii. Print the result.

Step 14: End the loop

Step 15: End.

Algorithm for Factorial of numbers from 1 to 20:

Step 1: Start.

Step 2: Declare the variables n , $fact$

Step 3: Initialize the values $n = 20$ and $fact = 1$.


Step 4: Start the loop from 1 to n

Step 5: calculate, $fact = fact * i$

Step 6: print the value of $fact$

Step 7: End.

PROGRAM:

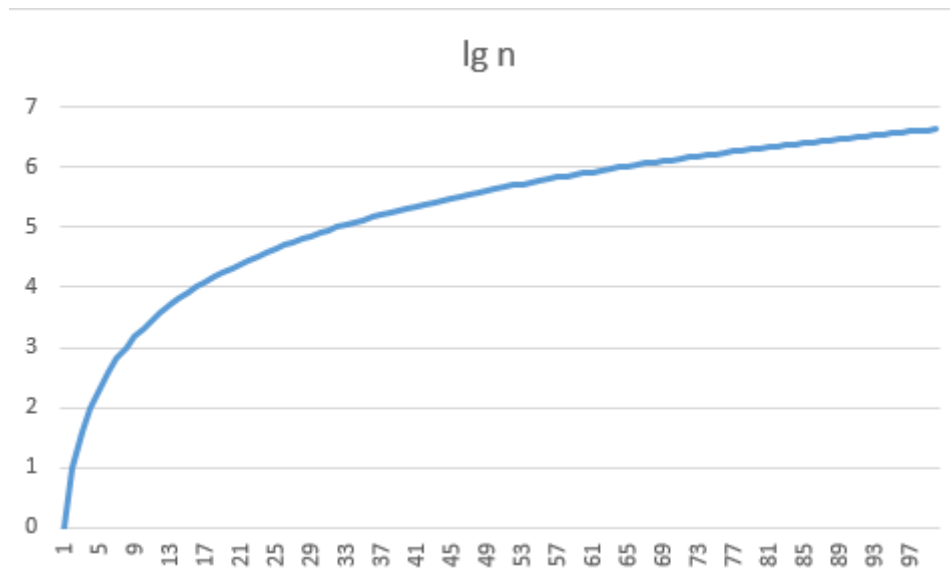
```
main.c yash   
1 // Online C compiler to run C program online  
2 #include <stdio.h>  
3 #include <math.h>  
4  
5  
6 int main() {  
7     float z,c,d,e,f,g,i,j;  
8     long double l,m,h,a,b;  
9  
10    long t;  
11    for (int i=0; i<=100; i++)  
12    {  
13        //(3/2)^n  
14        b=3.0/2.0;  
15        a = pow(b,i);  
16        printf ("%Lf \n",a);  
17  
18        //n^3  
19        t = pow(i,3);  
20        printf ("%ld \n",t);  
21  
22  
23        //nLgn  
24        l = i*log2(i);  
25        printf ("%Lf \n",l);  
26  
27        //Lgn  
28        c = log2(i);  
29        printf ("%f \n",c);  
30  
31        //2^Lgn  
32        e = pow(2,log2(i));  
33        printf ("%f \n",e);  
34  
35        //LgLgn  
36  
37        f = log2(log2(i));  
38        printf ("%f \n",f);  
39
```

```
40        //Lgn^2  
41        g = pow(log2(i),2);  
42        printf ("%f \n",g);  
43  
44        // n  
45        printf ("%d \n",i);  
46  
47        //Ln Ln n  
48        h = log10(log10(i));  
49        printf ("%Lf \n",h);  
50  
51        //n.2^n  
52        m = i*pow(2,i);  
53        printf ("%Lf \n",m);  
54    }  
55    return 0;  
56 }
```

Program for Factorial of numbers from 1 to 20:

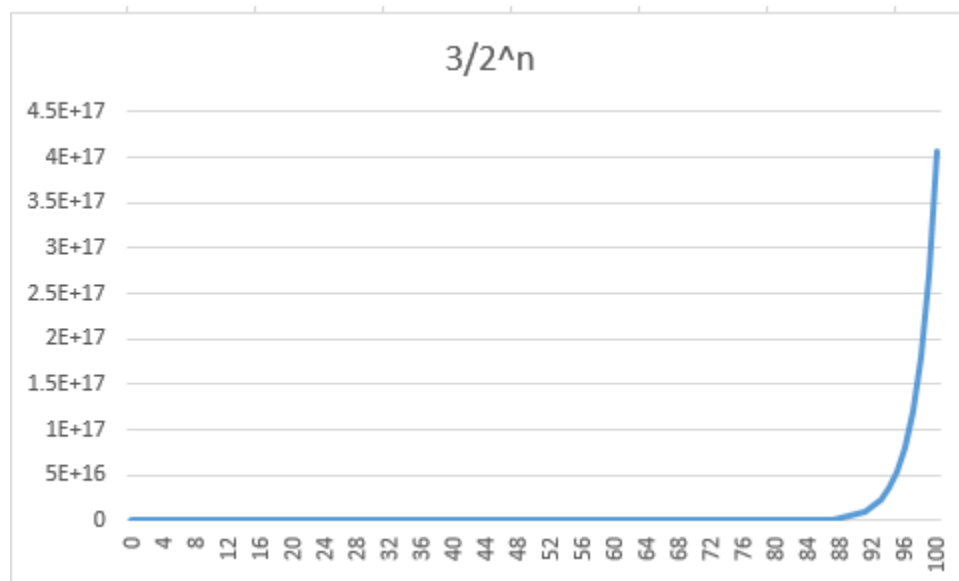
```
1
2  #include <stdio.h>
3
4  int main()
5  {
6      long n=20, fact =1;
7      for (int i=1;i<=n;i++)
8      {
9          fact = fact *i;
10         printf ("%ld \n",fact);
11     }
12
13
14     return 0;
15 }
16
```

Observation(Graph): Graphs of all 10 Functions :



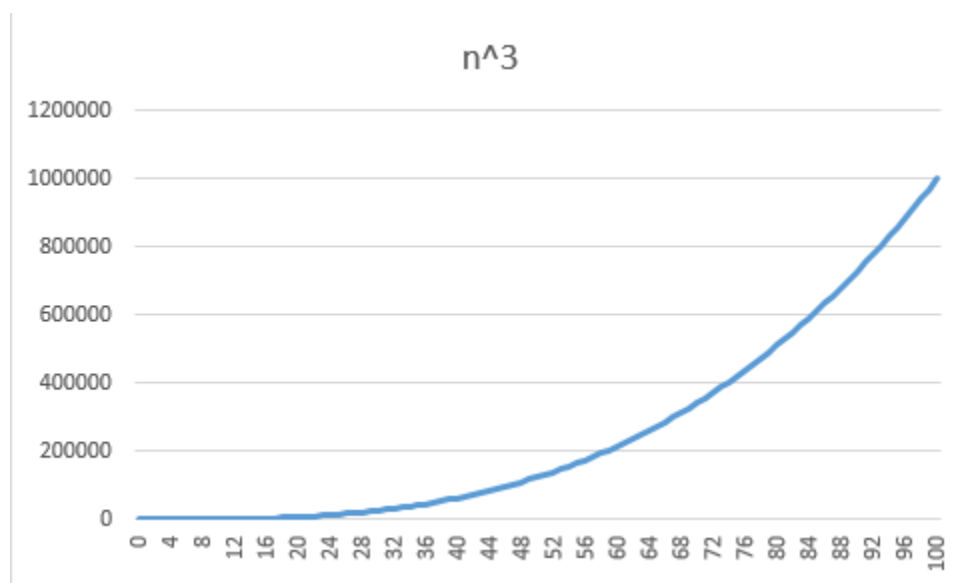
$lg(n)$:

For first Initial values Graph suddenly increases and then increasing curve decreases and there is a constant increase.



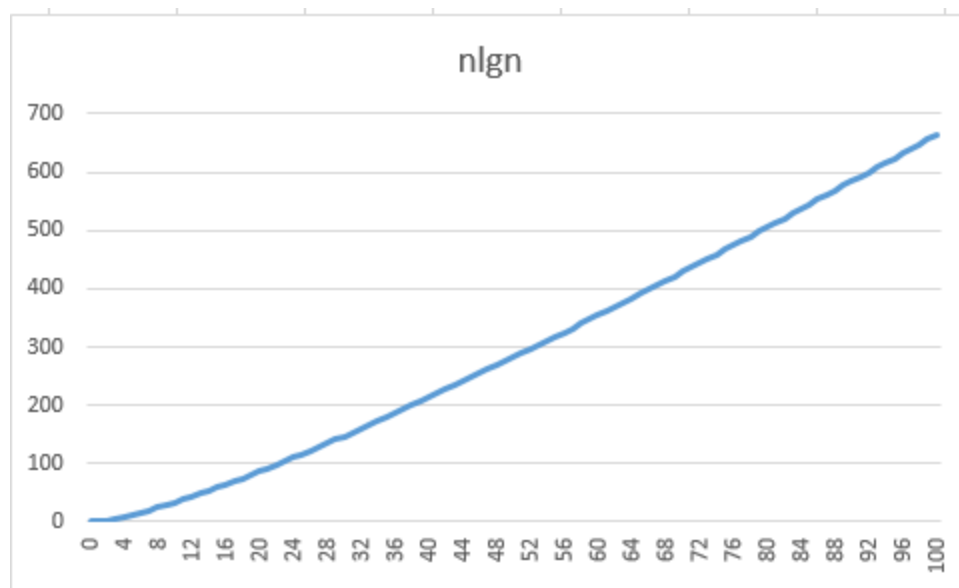
$3/2^n$:

In above observation, Graph is straight and for the last values there is a sudden increase in graph.



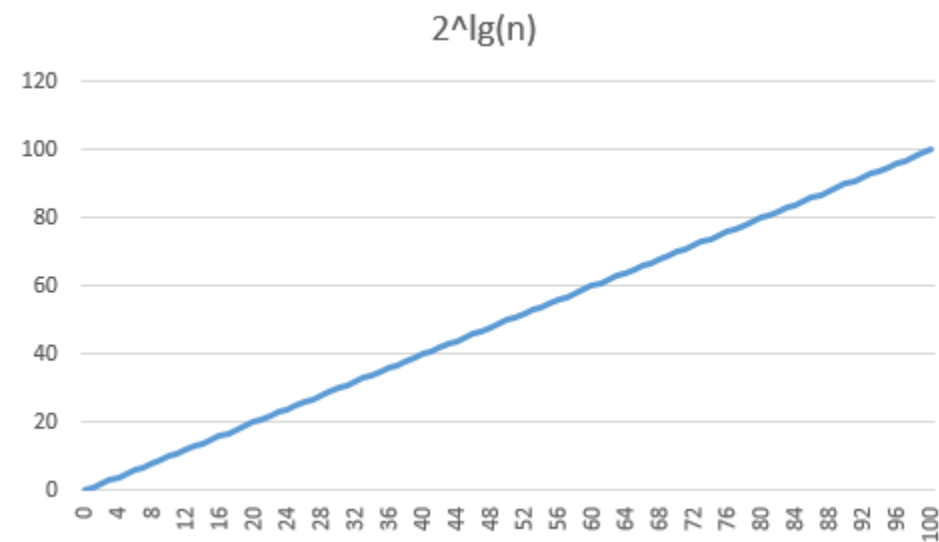
n^3 :

for this graph, for first few values there is no increase and after that there is constant increase



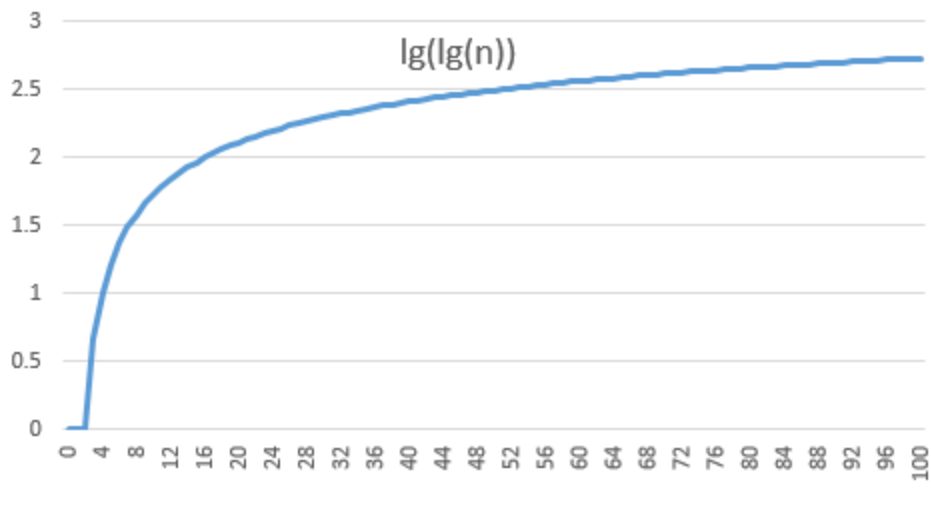
$n \lg n$:

there is constant increase from first value to last value. This is exponential increase.



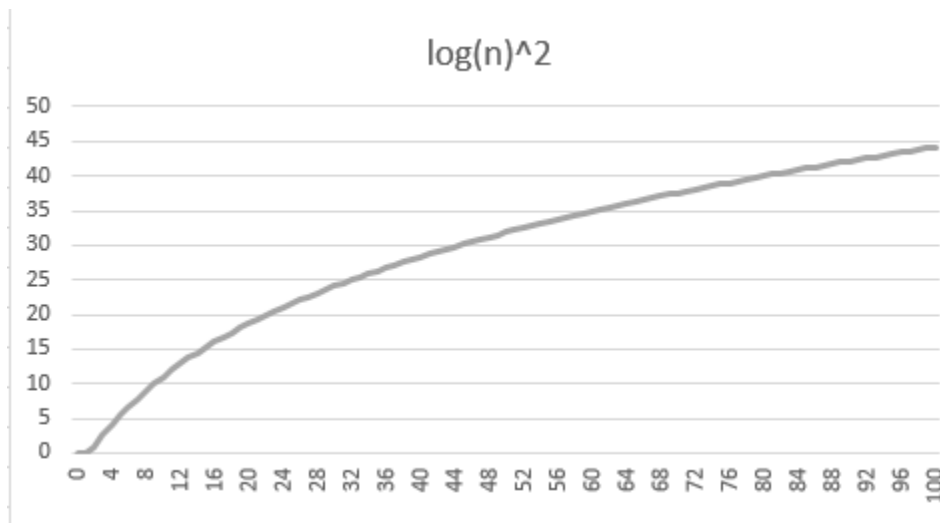
$2^{\lg(n)}$:

Linear increase in graph is observed.



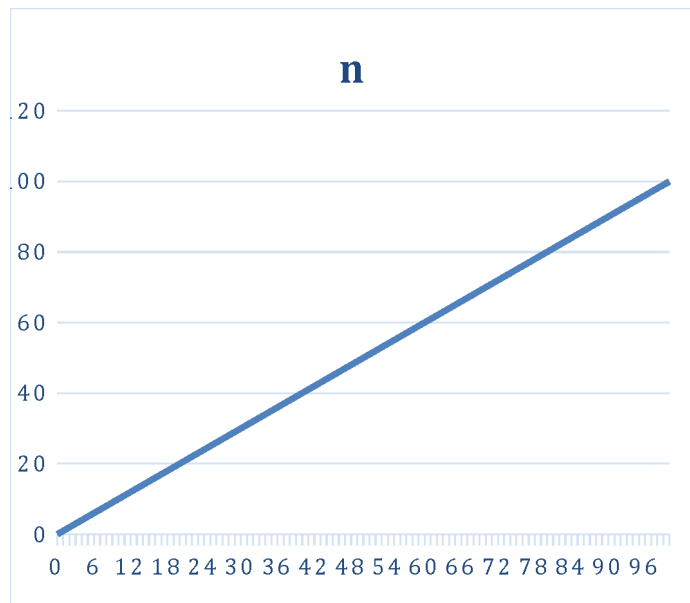
$\lg(\lg(n))$:

In the above graph, sudden growth is visible and after some values the curve of increase in graph gradually decreases.



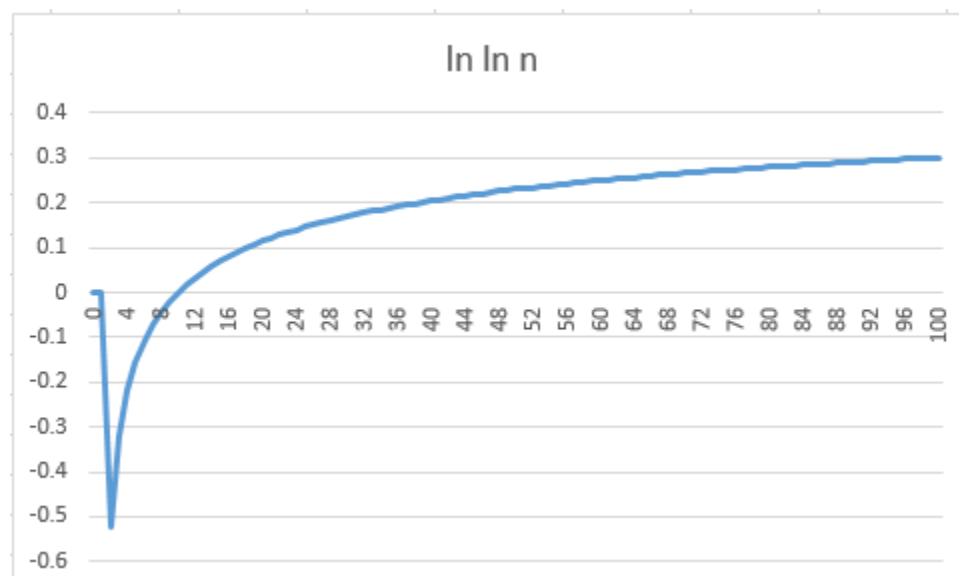
$\log^2 n$:

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



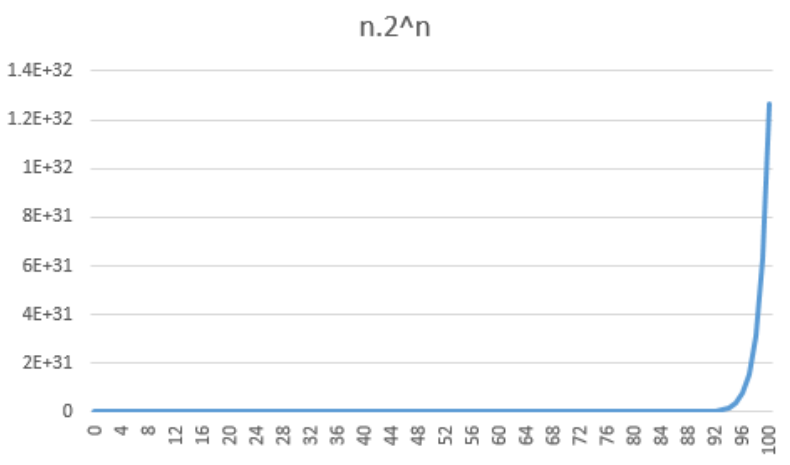
n:

In above graph, there is constant and linear growth that is straight forward increase in observed.



ln ln n:

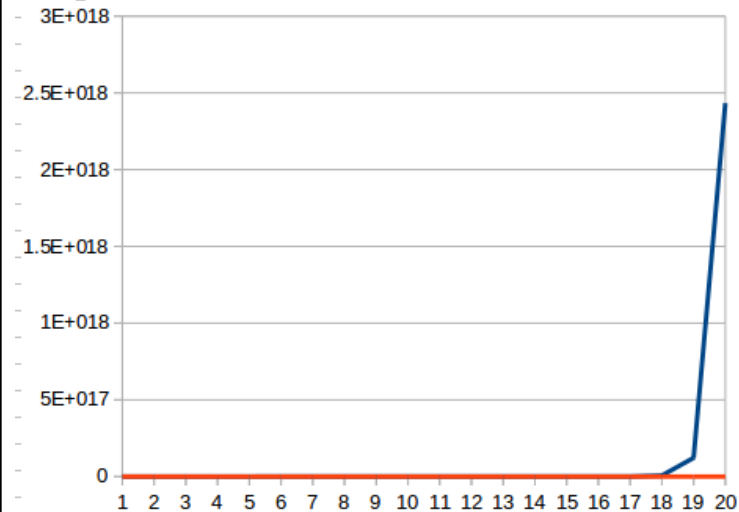
in the above graph, sudden spike is observed. Because of infinity value at first and then due to negative values, spike is observed. After that graph there is gradual increase in graph with the decrease curve.



$n \cdot 2^n$:

For the first numbers, there is no increase in graph and at last suddenly increase in the graph

Graph for Factorial of numbers from 1 to 20:



In above graph there is no rise for first few numbers and at last there is a sharp rise. As the graph rises in upward direction but as number increases graph also increases sharply.

CONCLUSION:

In this Practical, I printed the values of 10 functions which are selected by me and displayed the output of all the functions also Input was the numbers from 0 to 100. I plotted the 2D Graph x-axis represents the values of n and y-axis represent the function value for different n values using Microsoft Excel.