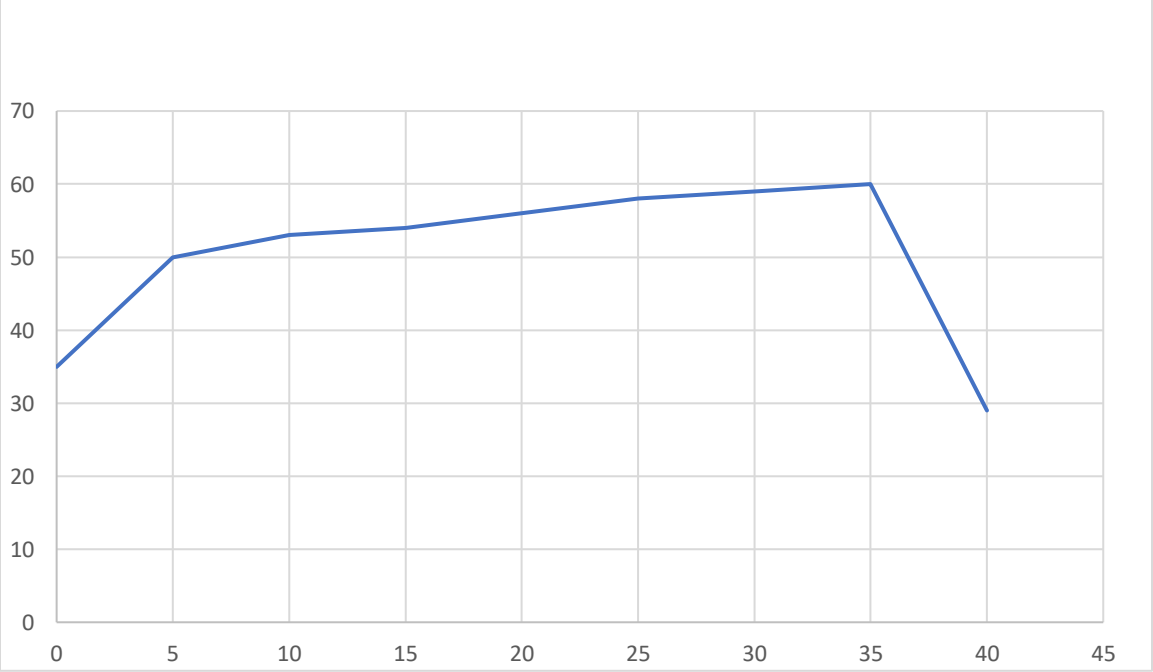
First Assignment

Intro :

in this assignment we will compare between iterative and recursive factorial functions to analyze performance and implementation differences.

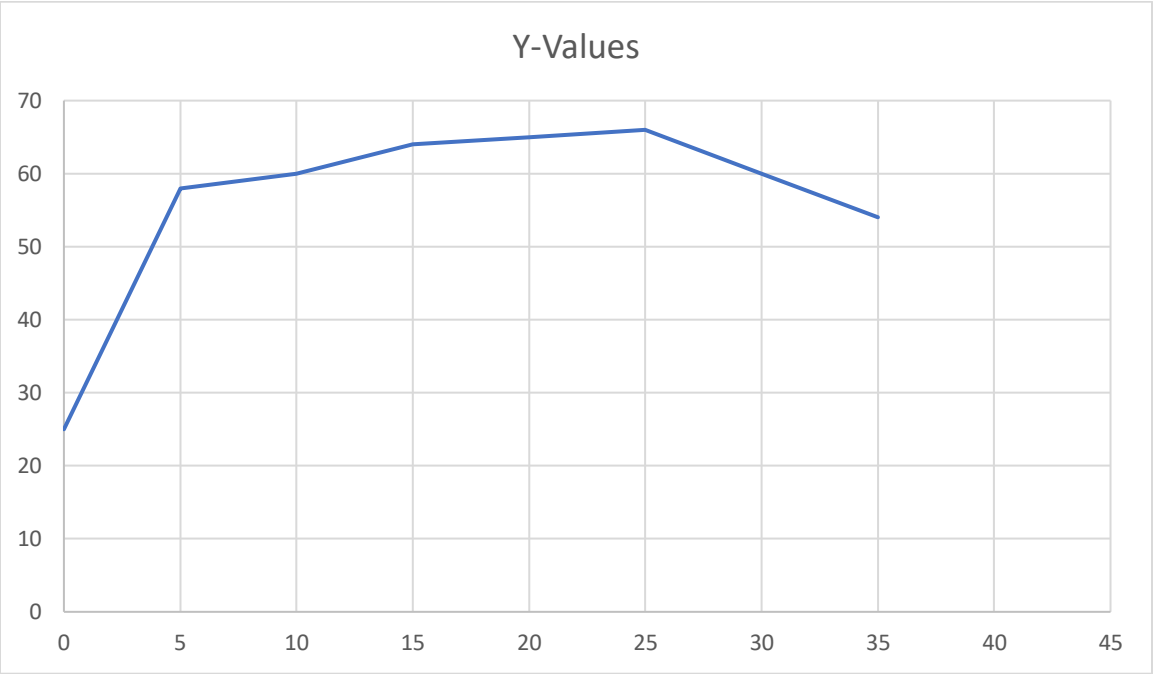
Iterative function :

value	5	10	15	20	25	30	35	40
time	50 ms	53 ms	54 ms	56 ms	58 ms	59 ms	60 ms	29 ms



Recursive function:

value	5	10	15	20	25	30	35	40
time	58 ms	60 ms	64 ms	65 ms	66 ms	60 ms	54 ms	29 ms



Note :

Stack overflow errors can occur in both iterative and recursive factorial functions at n=40 due to either deep recursion or excessive stack memory usage.

Discuss :

In our findings, the iterative factorial function consistently increased in execution time with larger n values, reflecting its linear time complexity. However, the recursive approach initially showed increasing execution times, but beyond a certain point, it demonstrated a decrease.

In summary, iterative factorial functions maintain a steady increase in time with n growth, contrasting with recursive methods that initially rise but then decline , Efficiency considerations are paramount in choosing factorial computation strategies.

Iterative function code :

```
long long factorial(long long n)


 {
    long long result = 1;
    for (int i = 1 ; i<=n ; i++)
    {
       result*=i;
    }
    return result ;
 }
```

Recursive function code :

```
long long factorial(long long n) {
   if (n == 0 || n == 1) {
      return 1;
   }
   return n * factorial(n - 1);
}
```