Que. Implement and Analysis factorial of a number program using iterative and recursive methods. / Implement Towers Of Hanoi problem with recursion.

Iterative methods

```
import java.util.Scanner;
public class Assignment1 {
    public static long factorialIterative(int n) {
        long result = 1;
        for (int i = 2; i <= n; i++) {
            result *= i;
        }
        return result;
    }
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number to compute factorial: ");
        int num = scanner.nextInt();

        if (num < 0) {
            System.out.println("Factorial is not defined for negative numbers.");
            return;
        }
```

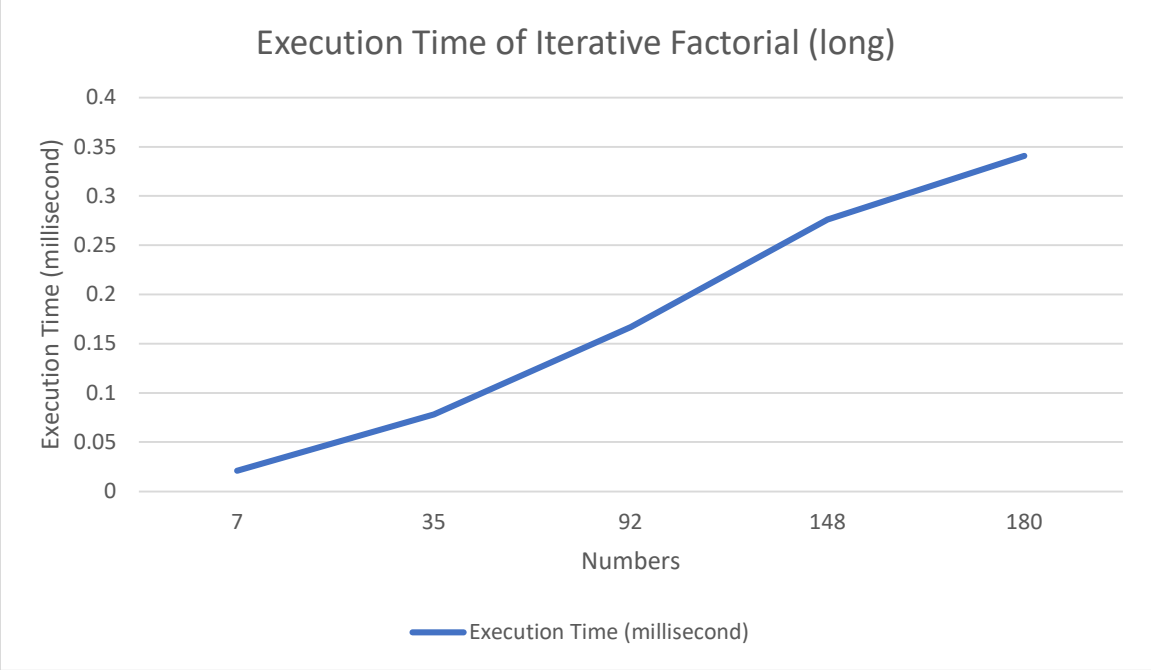
```
        long start = System.nanoTime();
        long result = factorialIterative(num);
        long end = System.nanoTime();
         double timeTaken = (end - start) / 1e6; // milliseconds
        System.out.println("Factorial of " + num + " is: " + result);
        System.out.println("Execution time: " + timeTaken + " ms");
        scanner.close();
    }
}
```

Output :-

Enter a number to compute factorial: 5

Factorial of 5 is: 120

Execution time: 0.021 ms



Recursive methods

```
import java.util.Scanner;
public class RecursiveFactorial {
   // Recursive method to calculate factorial
   public static long factorialRecursive(int n) {
      if (n == 0 || n == 1)
         return 1;
      return n * factorialRecursive(n - 1);
   }
   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      // Input from user
      System.out.print("Enter a number to compute factorial: ");
      int num = scanner.nextInt();
      // Validation
      if (num < 0) {
         System.out.println("Factorial is not defined for negative numbers.");
         return;
      }
      // Measure execution time
      long start = System.nanoTime();
      long result = factorialRecursive(num);
      long end = System.nanoTime();
```

```
        // Convert time to milliseconds
        double timeTaken = (end - start) / 1e6;
        // Output results
        System.out.println("Factorial of " + num + " is: " + result);
        System.out.println("Execution time: " + timeTaken + " ms");


       scanner.close();
    }
}
```

Output :-

```
Enter a number to compute factorial: 5
Factorial of 5 is: 120
Execution time: 0.02 ms
```