

Lesson:



Problems based on Recursion – 1



Pre-Requisites

- Functions
- Recursion basics

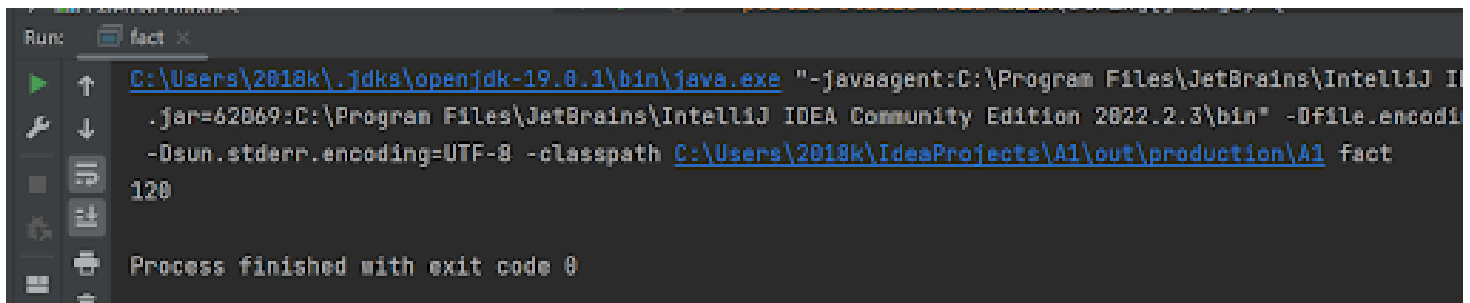
List of Concepts Involved :

- Find the value of 5!.
- Write a Program to find the nth fibonacci number.

Problem 1 Find the value of 5!.

Code

<https://pastebin.com/pn2b22Dc>



```
Run: fact x
C:\Users\2018k\.jdk\openjdk-19.0.1\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ I
.jar=62869:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2022.2.3\bin" -Dfile.encodi
-Dsun.stderr.encoding=UTF-8 -classpath C:\Users\2018k\IdeaProjects\A1\out\production\A1 fact
120
Process finished with exit code 0
```

Output - 120

Explanation -

For any number 'n', we can write its factorial as 'n' multiplied by the factorial of its previous number. This is a statement we know to be true. So we recursively call our function to return to us the factorial of the previous number in order to calculate the factorial of the current number by the help of this statement.

5*factorial(4);

5*4*factorial(3);

5*4*3*factorial(2);

5*4*3*2*factorial(1);

5*4*3*2*1;

factorial(5) will call for factorial(4)
 factorial(4) will call for factorial(3)
 factorial(3) will call for factorial(2)
 factorial(2) will call for factorial(1)

Now we know the value of factorial(1) to be 1. So we simply return the value i.e. our base case.

Now factorial(1) will return 1. Using this value factorial(2) will be calculated.

factorial(2) = 2 * factorial(1) = 2 * 1 = 2

Similarly,

factorial(3) = 3 * factorial(2) = 3 * 2 = 6

factorial(4) = 4 * factorial(3) = 4 * 6 = 24

factorial(5) = 5 * factorial(4) = 5 * 24 = 120

At the end we have factorial(5) = 120, the desired output.

Problem 2 Write a Program to find the nth fibonacci number.

The Fibonacci series is the sequence of numbers, where every number is the sum of the preceding two numbers, such that the first two terms are '0' and '1'.

The Fibonacci numbers are the numbers in the following integer sequence.

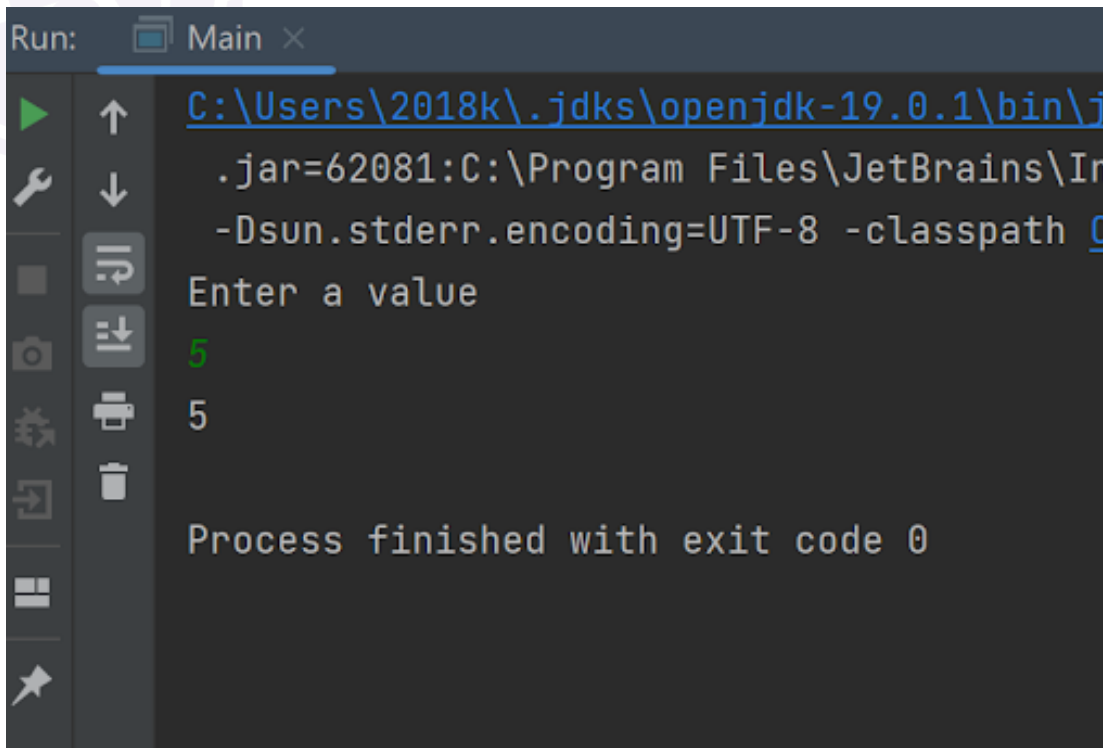
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144,

In mathematical terms, the sequence F_n of Fibonacci numbers is defined by the recurrence relation

$$F_n = F_{n-1} + F_{n-2}$$

Here $F_0=0, F_1=1, F_2=1$

Code Link <https://pastebin.com/2AkLy0GC>



```

Run: Main x
C:\Users\2018k\.jdk\openjdk-19.0.1\bin\java.exe
.jar=62081:C:\Program Files\JetBrains\IntelliJ IDEA\bin\
-Dsun.stderr.encoding=UTF-8 -classpath C:\Program Files\JetBrains\IntelliJ IDEA\bin\
Enter a value
5
5
Process finished with exit code 0
    
```

