
Lab Assignment 9

Recursive Method



CSE110: Programming Language I

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Lab Tasks

(No Need to Submit)

Task01

[A,B,C should be written in a single java file]

A. Write a method called **oneToN** that prints 1 till N recursively.

Hint: N is a number taken as input from the user and you need to print the numbers starting from 1 to N recursively.

Sample Input	Sample Method Call	Output
N = 5	oneToN(1,N);	1 2 3 4 5
N = 11	oneToN(1,N);	1 2 3 4 5 6 7 8 9 10 11

B. Write a method **nToOne** that prints from N to 1 recursively.

Hint: N is a number taken as input from the user and you need to print the numbers starting from N to 1.

Sample Input	Sample Method Call	Output
N = 6	nToOne(1,N);	6 5 4 3 2 1
N = 3	nToOne(1,N);	3 2 1

C. Write a method called **recursiveSum** to sum till N recursively.

Hint: N is a number taken as input from the user and you need to add the numbers starting from 1 to N recursively and print the sum.

Sample Input	Sample Method Call	Output
N = 4	System.out.println(recursiveSum(1,N));	10
N = 12	System.out.println(recursiveSum(1,N));	78

Task02

Write a **recursive method** called **reverseDigits** that takes an integer n as an argument and prints the digits of n in reverse order.

Hint: Think about how you solved it using loop

Sample Input	Sample Method Call	Output
n = 12345	reverseDigits(n);	5 4 3 2 1
n = 649	reverseDigits(n);	9 4 6
n = 1000	reverseDigits(n);	0 0 0 1

Task03

Write a **recursive method** called **sumDigits** that takes an integer n as an argument and sums up the digits of n then **returns** the result.

Hint: Think about how you would solve it using loop

Sample Input	Sample Method Call	Output
n = 12345	int x = sumDigits(n); System.out.println(x);	15
n = 649	int x = sumDigits(n); System.out.println(x);	19

Task04

Write a **recursive method** called **reverse_string(s, idx)** that returns the reverse of a given string **s**.

Sample Method Call	Output
System.out.println(reverse_string("Hello", 0))	olleH
System.out.println(reverse_string("swan", 0))	naws

Task05

Trace the following code to generate the outputs. Show the necessary trace table.

1	<code>public class ClassWork1{</code>
2	<code> public static int calculate(int n) {</code>
3	<code> if (n <= 0){</code>
4	<code> return 4;</code>
5	<code> }</code>
6	<code> else if (n % 2 != 0){</code>
7	<code> return n + calculate(n - 1);</code>
8	<code> }</code>
9	<code> else{</code>
10	<code> return n * calculate(n - 2);</code>
11	<code> }</code>
12	<code> }</code>
13	<code> public static void main(String[] args) {</code>
14	<code> int result = calculate(8);</code>
15	<code> System.out.println(result);</code>
16	<code> int result2 = calculate(5);</code>
17	<code> System.out.println(result2);</code>
18	<code> }</code>
19	<code>}</code>

Home Tasks

Task01

Write a **recursive method** called **factorial(n)** that returns the factorial of a number **n**. Assume $n \geq 0$.

Sample Input	Sample Method Call	Output
n = 5	int x = factorial(n); System.out.println(x);	120
n = 7	int x = factorial(n); System.out.println(x);	5040

Task02

Write a **recursive method** called **power(base, exponent)** that calculates base raised to the power of exponent (assume exponent is a non-negative integer).

Sample Method Call	Output
int x = power(5,3); System.out.println(x);	125
int x = power(8,4); System.out.println(x);	4096

Task03

Write a **recursive method** called **print_elements(arr, index)** that prints elements of an array starting from index to the end.

Given Array and Input	Sample Method Call	Output
<pre>int[] arr = {5,6,2,1,8,7}; int index = 2;</pre>	<pre>print_element(arr, index);</pre>	2 1 8 7
<pre>int[] arr = {13,12,19,21,31,55}; int index = 0;</pre>	<pre>print_element(arr, index);</pre>	13 12 19 21 31 55

Task04

The Fibonacci sequence is a series of numbers that starts with 0 & 1 and the rest of the numbers are generated by adding the immediate two numbers before it. It goes like this: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 and so on.

In short, $\text{fibonacci}(0) = 0$, $\text{fibonacci}(1) = 1$ and $\text{fibonacci}(n) = \text{fibonacci}(n-1) + \text{fibonacci}(n-2)$.

Sample Method Call	Output
<pre>System.out.println(fibonacci(0));</pre>	0
<pre>System.out.println(fibonacci(1));</pre>	1
<pre>System.out.println(fibonacci(5));</pre>	5
<pre>System.out.println(fibonacci(9));</pre>	34

Task05

Trace the following code to generate the outputs. Show the necessary trace table.

1	<code>public class ClassWork2{</code>
2	<code> public static String fun(String s, int n){</code>
3	<code> if(s.length()==4){</code>
4	<code> return n+s+n;</code>
5	<code> } else if(n%2==0){</code>
6	<code> System.out.println(s+n+n+3);</code>
7	<code> return fun(s+n, n+3);</code>
8	<code> } else {</code>
9	<code> System.out.println(s+n+(n-1));</code>
10	<code> return fun(s+n, n-1);</code>
11	<code> }</code>
12	<code> }</code>
13	<code> public static void main(String[] args){</code>
14	<code> String s = fun("",1);</code>
15	<code> System.out.println(s);</code>
16	<code> }</code>
17	<code>}</code>