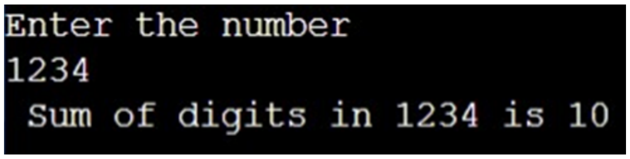
Q1 : Given an integer, find out the sum of its digits using recursion.
Input: n= 1234
Output: 10
Explanation: 1+2+3+4=10

Solution :
Code : ASS_Code1.java
Output :



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Enter the number
1234
 Sum of digits in 1234 is 10
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Approach:
Let's define a function func which will take a number as input and will return the sum of all of its digits. now this function can we written in this way first digit + sum of remaining digit (the same way human do sum in left to right manner) but as extracting first digit is relatively tough thus we will start with last digit so the function func(num) can be written as func(num) = last_digit + func(num after removing last digit). Now to get the last digit we can use % operator and to remove the last digit we can use / operator.

Let's see the step-by-step approach for a better understanding of how the algorithm works.

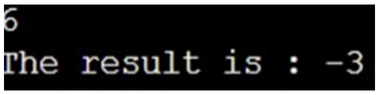
- Let the number be 1234.
- Step 1-> 1234 % 10 which is equal-to 4 + (send 1234/10 to next step)
- Step 2-> 123 % 10 which is equal-to 3 + (send 123/10 to next step)
- Step 3-> 12 % 10 which is equal-to 2 + (send 12/10 to next step) Step 4-> 1 % 10 which is equal-to 1 + (send 1/10 to next step) Step 5-> 0 algorithm stops.

Q2: Given a number n. Find the sum of natural numbers till n but with alternate signs.
That means if n = 5 then you have to return 1-2+3-4+5 = 3 as your answer.
Constraints : 0<=n<=1e6
Input1 : n = 10
Output 1 : -5
Explanation : 1-2+3-4+5-6+7-8+9-10 = -5
Input 2 : n = 5
Output 2 : 3

Solution:

Code : ASS_Code2.java

Output :



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6
The result is : -3
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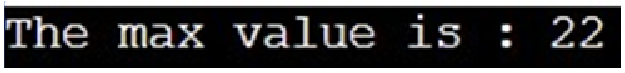
Approach :

- Here,we have created a go function of int type to get the sum of natural numbers with alternate signs till given n.
- We have passed 2 parameters ,n (the number till you want the alternating sequence sum) , a variable i (to keep track of odd and even numbers) .
- If i has reached n+1(base case condition) that means we have already calculated the sum of the sequence till n so we returned from this function.
- If this is not the case(i.e i<=n) we can clearly observe from the sequence that every even number of this sequence is added with a negative polarity while every odd number is added with positive polarity.
- We have done the same as we observed in the pattern. For every 'i' we check if the if i is odd then we return the sum of (i) and value returned by go(n,i+1) and if i is even then we return the sum of (-i) and value returned by go(n,i+1). This is how we are recursively calling the go function.

Q3: Print the max value of the array [13, 1, -3, 22, 5].

Code: ASS_Code3.java

Output :



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The max value is : 22
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Approach :

- We start our function call from maxValue(arr, 5,0) which calls for maxValue(arr,5, 1) and so on. We will reach our base case at the last index of the array. In this case, it will be index 4. In the base case, since we have only one value, we can say that for the array portion starting from that index, the value itself is the max value that we can get.

MaxValue(arr,5, 4) will return arr[4] i.e. 5.

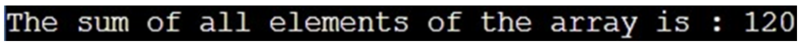
Using this the max value of the array part starting at index 3 will be calculated.

MaxValue(arr,5, 3)= max(arr[3], MaxValue(arr,5, 4))
= max(22, 5)
= 22
Similarly,
MaxValue(arr,5, 2)= max(arr[2], MaxValue(arr,5, 3))
= max(-3, 22)
= 22

MaxValue(arr,5, 1)= max(arr[1], MaxValue(arr,5, 2))
= max(1, 22)
= 22

MaxValue(arr,5, 0)= max(arr[0], MaxValue(arr,5, 1))
= max(13, 22)
= 22

At the end we have MaxValue(arr,5, 0)= 22, the desired output.



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The sum of all elements of the array is : 120
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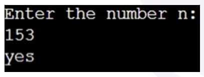

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Enter the number n:
153
yes
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