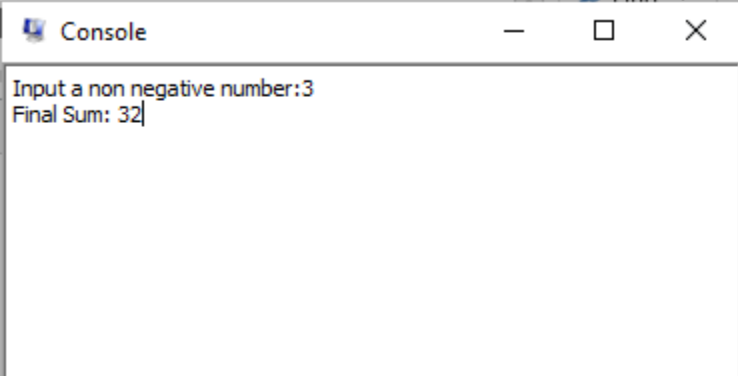


- Assignment 4
- Problem no: 1 and 2
- Semester: 5
- Group No 27
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- Yash Sirvi (21CS10083)

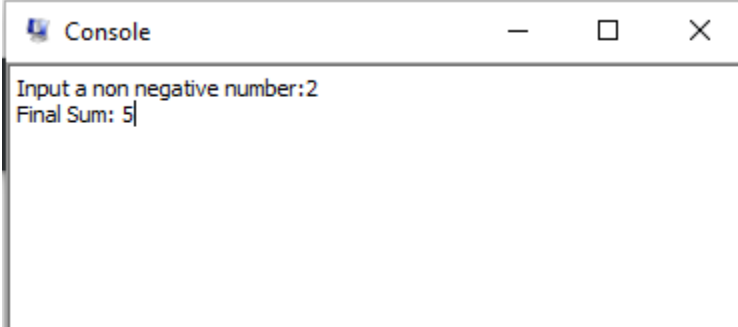
## Question 1

- Question 1 is about finding the sum of series  $1^1 + 2^2 + 3^3 + \dots + n^n$  for a positive integer  $n$ .
- **Base Condition:** when  $n = 1$ ,  $\text{sum}(1) = 1$
- **Recursive Condition:** if  $n \neq 1$ ,  $\text{sum}(n) = n^n + \text{sum}(n-1)$
- Register **\$v0 stores the final sum**
- We reserve **8 bytes on stack** to store the current number and the return address for the recursion as this information is to be restored after the recursion

### Sample output:



```
Console
Input a non negative number:3
Final Sum: 32
```



```
Console
Input a non negative number:2
Final Sum: 5
```

## Question 2

- Question 2 is about finding the number of steps a number will take to reach 1 following the rules given in Collatz Conjecture.  $N \rightarrow N/2$  if  $N$  is even, else  $N \rightarrow 3*N + 1$
- **Base condition:**  $N = 1$ ,  $\text{steps}(1) = 0$
- **Recursive Condition:** if  $N \neq 1$ 
  - If  $N$  is even,  $\text{steps}(N) = 1 + \text{steps}(N/2)$
  - If  $N$  is odd,  $\text{steps}(N) = 1 + \text{steps}(3*N + 1)$
- Register **\$v0 stores the number of steps**
- Register  $\$t2$  stores value 2 and  $\$t3$  stores value 3 for division and multiplication respectively
- We only reserve **4 bytes on the stack** for storing the return address for recursion. This time, we don't need the current value of  $N$  so we can save 4 bytes of memory by not storing it.

**Note:** We make sure that the input number is positive for both questions.

### Sample output:

