

# Rajalakshmi Engineering College

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## NeoColab\_REC\_CS23221\_Python Programming

### REC\_Python\_Week 2\_PAH\_Updated

Attempt : 1  
Total Mark : 60  
Marks Obtained : 60

#### Section 1 : Coding

##### 1. Problem Statement

Rajesh wants to design a program that simulates a real-time scenario based on a mathematical concept known as the Collatz Conjecture. This concept involves the repeated application of rules to a given starting number until the number becomes 1. The rules are as follows:

If the number is even, divide it by 2. If the number is odd, multiply it by 3 and add 1.

Your task is to write a program that takes a positive integer as input, applies the Collatz Conjecture rules to it, counts the number of steps taken to reach 1, and provides an output accordingly. If the process exceeds 100 steps, the program should print a message indicating so and use break to exit.

### ***Input Format***

The input consists of a single integer, n.

### ***Output Format***

The output displays the total number of steps taken to reach 1 if it's under 100.

If it's more than 100, it displays "Exceeded 100 steps. Exiting..".

Refer to sample output for the formatting specifications.

### ***Sample Test Case***

Input: 6

Output: Steps taken to reach 1: 8

### ***Answer***

```
# Read the input integer
n = int(input())
```

```
# Initialize step counter
steps = 0
```

```
# Loop until n becomes 1 or steps exceed 100
```

```
while n != 1:
```

```
    if steps >= 100:
```

```
        print("Exceeded 100 steps. Exiting..")
```

```
        break
```

```
    if n % 2 == 0:
```

```
        n = n // 2
```

```
    else:
```

```
        n = 3 * n + 1
```

```
    steps += 1
```

```
# Check if the process completed within 100 steps
```

```
if n == 1:
```

```
    print(f"Steps taken to reach 1: {steps}")
```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement

Kamali recently received her electricity bill and wants to calculate the amount she needs to pay based on her usage. The electricity company charges different rates based on the number of units consumed.

For the first 100 units, there is no charge. For units consumed beyond 100 and up to 200, there is a charge of Rs. 5 per unit. For units consumed beyond 200, there is a charge of Rs. 10 per unit.

Write a program to help Kamali calculate the amount she needs to pay for her electricity bill based on the units consumed.

### ***Input Format***

The input consists of an integer, representing the number of units.

### ***Output Format***

The output prints the total amount of the electricity bill, an integer indicating the amount Kamali needs to pay in the format "Rs. amount".

Refer to the sample output for the exact format.

### ***Sample Test Case***

Input: 350

Output: Rs. 2000

### ***Answer***

```
# Read the number of units consumed
units = int(input())
```

```
# Initialize the total amount
amount = 0
```

```
# Calculate the bill based on the usage
if units > 200:
```

```
    # Units beyond 200 are charged Rs. 10 per unit
    amount += (units - 200) * 10
```

```
# Units between 101 and 200 are charged Rs. 5 per unit
amount += (200 - 100) * 5
elif units > 100:
    # Units between 101 and 200 are charged Rs. 5 per unit
    amount += (units - 100) * 5
# Units up to 100 are free, so no charge

# Print the result
print(f"Rs. {amount}")
```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement

Aarav is fascinated by the concept of summing numbers separately based on their properties. He plans to write a program that calculates the sum of even numbers and odd numbers separately from 1 to a given positive integer.

Aarav wants to input an integer value to represent the upper limit of the range. Help Aarav by developing a program that computes and displays the sum of even and odd numbers separately.

#### **Input Format**

The input consists of a single integer N, where N is the upper limit of the range.

#### **Output Format**

The output consists of two lines:

- The first line displays the sum of even numbers from 1 to N.
- The second line displays the sum of odd numbers from 1 to N.

Refer to the sample output for the exact format.

#### **Sample Test Case**

Input: 10

Output: Sum of even numbers from 1 to 10 is 30  
Sum of odd numbers from 1 to 10 is 25

**Answer**

```
# Read the input upper limit
N = int(input())
```

```
# Initialize sums
sum_even = 0
sum_odd = 0
```

```
# Loop through 1 to N and sum based on property
for num in range(1, N + 1):
    if num % 2 == 0:
        sum_even += num
    else:
        sum_odd += num
```

```
# Output the results in the specified format
print(f"Sum of even numbers from 1 to {N} is {sum_even}")
print(f"Sum of odd numbers from 1 to {N} is {sum_odd}")
```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement

Sophia, a primary school teacher, wants to calculate the sum of numbers within a given range, excluding those that are multiples of 3.

Write a program to help Sophia compute the sum of all numbers between start and end (inclusive) that are not divisible by 3 using the continue statement.

**Input Format**

The first line of input consists of an integer, representing the starting number of the range.

The second line of input consists of an integer, representing the ending number of the range.

### **Output Format**

The output prints a single integer, representing the sum of numbers in the range that are not multiples of 3.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 1

10

Output: 37

### **Answer**

```
# Read input values
start = int(input())
end = int(input())

total_sum = 0

# Iterate through the range from start to end (inclusive)
for num in range(start, end + 1):
    # Skip numbers that are divisible by 3
    if num % 3 == 0:
        continue
    # Add the number to the total sum if it's not divisible by 3
    total_sum += num

# Output the result
print(total_sum)
```

**Status :** Correct

**Marks :** 10/10

## **5. Problem Statement**

Imagine being entrusted with the responsibility of creating a program that simulates a math workshop for students. Your task is to develop an interactive program that not only calculates but also showcases the charm of factorial values. Your program should efficiently compute and present

the sum of digits for factorial values of only odd numbers within a designated range. This approach will ingeniously keep even factorials at bay, allowing students to delve into the intriguing world of mathematics with enthusiasm and clarity.

### ***Input Format***

The input consists of a single integer, n.

### ***Output Format***

The output displays the factorial and sum of digits of the factorial of odd numbers within the given range.

Refer to the sample output for the formatting specifications.

### ***Sample Test Case***

Input: 6

Output: 1! = 1, sum of digits = 1

3! = 6, sum of digits = 6

5! = 120, sum of digits = 3

### ***Answer***

```
import math
```

```
# Read the input value
n = int(input())
```

```
for num in range(1, n + 1):
```

```
    # Process only odd numbers
```

```
    if num % 2 != 0:
```

```
        factorial_value = math.factorial(num)
```

```
        # Calculate the sum of digits
```

```
        digits_sum = sum(int(digit) for digit in str(factorial_value))
```

```
        # Display the result
```

```
        print(f"{num}! = {factorial_value}, sum of digits = {digits_sum}")
```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement

As a software engineer, your goal is to develop a program that facilitates the identification of leap years in a specified range. Your task is to create a program that takes two integer inputs, representing the start and end years of the range and then prints all the leap years within that range.

### ***Input Format***

The first line of the input consists of an integer, which represents the start year.

The second line consists of an integer, which represents the end year.

### ***Output Format***

The output displays the leap years within the given range, separated by lines.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 2000

2053

Output: 2000

2004

2008

2012

2016

2020

2024

2028

2032

2036

2040

2044

2048

2052

### ***Answer***

```
# Read input values
start_year = int(input())
```



```
end_year = int(input())
```

```
# Iterate through the range and check for leap years
```

```
for year in range(start_year, end_year + 1):
```

```
    # Leap year condition:
```

```
    # - divisible by 4
```

```
    # - not divisible by 100 unless divisible by 400
```

```
    if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
```

```
        print(year)
```

**Status :** Correct

**Marks :** 10/10