

You are a tutor for an entry-level programming course at a university.

Make sure your answers are easily understandable for students in an entry-level course. Therefore explain all concepts that are used.

Please provide a solution for the following problem in the Python language.

Given an integer  $N$ , find the number of divisors of  $N$  that are divisible by 3.

To solve this problem, we'll need to find how many divisors of a given integer  $N$  are divisible by 3. Let's break this down step by step:

Step 1: Understanding Divisors

A divisor of a number  $N$  is any integer  $d$  such that  $N$  divided by  $d$  leaves no remainder. In other words,  $d$  is a divisor of  $N$  if  $N \% d == 0$ , where  $\%$  is the modulus operator in Python that gives the remainder of the division.

Step 2: Divisors Divisible by 3

We want to specifically count those divisors of  $N$  that are also divisible by 3. This means for each divisor  $d$  of  $N$ , we also need to check if  $d \% 3 == 0$ .

Step 3: Iterating through Potential Divisors

To find all divisors, we can iterate from 1 to  $N$  (inclusive) and check if the current number is a divisor of  $N$ . If it is, we'll then check if this divisor is divisible by 3.

Step 4: Counting the Valid Divisors

For each divisor that meets both conditions (it's a divisor of  $N$  and divisible by 3), we'll increment a count.

Here is the Python code that implements this logic:

```
python Code kopieren
def count_divisors_by_3(N):
    count = 0 # This will store the number of divisors divisible by 3

    # Iterate over all numbers from 1 to N
    for i in range(1, N + 1):
        # Check if i is a divisor of N
        if N % i == 0:
            # Check if the divisor is divisible by 3
            if i % 3 == 0:
                count += 1

    return count

# Example usage:
N = 18
result = count_divisors_by_3(N)
print(f"The number of divisors of {N} that are divisible by 3 is: {result}")
```

Explanation of the Code:

- Initialization** ('count = 0'): We start with a counter set to zero to keep track of how many divisors of  $N$  are divisible by 3.
- Loop** ('for i in range(1, N + 1)'): We loop through every integer  $i$  from 1 to  $N$  to check if it is a divisor of  $N$ .
- Divisibility Check** ('if N % i == 0'): For each  $i$ , we check if  $N \% i == 0$ . If this condition is true,  $i$  is a divisor of  $N$ .
- Check if Divisible by 3** ('if i % 3 == 0'): If  $i$  is a divisor, we further check if  $i$  is divisible by 3.
- Counting** ('count += 1'): If both conditions are satisfied, we increment our count by 1.
- Return the Result**: Finally, after the loop finishes, we return the count, which represents the number of divisors of  $N$  that are divisible by 3.

Example:

For  $N = 18$ , the divisors of 18 are 1, 2, 3, 6, 9, and 18. Out of these, 3, 6, 9, and 18 are divisible by 3. Thus, the function will return 4.

This solution efficiently counts the divisors divisible by 3 using simple iteration and conditional checks, making it well-suited for entry-level students.

