Project Euler 1

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The Problem

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Find the sum of all the multiples of 3 or 5 below 1000.

Arithmetic Series

let $S_n = \sum_{i=1}^{\lfloor 999/n \rfloor} in$. Then the sum of all multiples of 3 or 5 below 1000 can be written as $S_3 + S_5 - S_{15}$. The subtracted S_{15} term is included so multiples of both 3 and 5, $\{15, 30, 45, ..., 990\}$, aren't double counted in the summation.

As an arithmetic series, $S_3 = \frac{1}{2} \lfloor \frac{999}{3} \rfloor (3+999) = \frac{1}{2} \cdot 333 \cdot 102 = 166833$. Likewise, $S_5 = 99500$ and $S_{15} = 33165$. Then, $S_3 + S_5 - S_{15} = 233168$.

Script Solution

```
summation = 0

for i in range(1, 1000):

    if (not i%3) or (not i%5):
        summation += i

print(summation)
```