Problem 0001

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.

Solution

Variables

- Let n be a number.
- Let o be the product of n and 3 or 5.
- Let k be the exclusive upper limit for values of of o.
- Let m be an array of values of o.
- Let s be the sum of the values of unique items of m.

Approach

Initially, n is equal to 1. At the end of every iteration, n is increased by 1.

For every value of n, 2 values of o are calculated. The first value of o is calculated by multiplying n by 3. If $o < k$, then o is appended to m. The second value of o is calculated by multiplying n by 5. If o satisfies the equality $o < k$, then o is appended to m.

If the length of m is unchanged, this means that no values of o satisfied the equality $o < k$. This means that no subsequent values of n will form values of o which satisfy $o < k$. Therefore, at this point, the iterations should be stopped.

s can be calculated as the sum of the values of unique values of m. Only unique values are summed as there will be duplicate values of items of m, such as 15, which can be produced when $n = 3$ or $n = 5$.

Code

The code to produce this solution is in `solution.py`.

Output

For $k = 10$, the program correctly outputs `s = 23`, as specified within the problem text.

For $k = 1000$, the program outputs `s = 233168`, which is correct.