

Problem 52 - Permuted Multiples

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This document originally appeared as a blog post on my website. Find it at gautammanohar.com/euler/52.

1 Problem Statement

It can be seen that the number 125874 and its double, 251748, contain exactly the same digits, but in a different order. Given N , find all the positive integers up $x \leq N$ such that $2x, 3x, \dots, Kx$ contain the same digits.

2 My Algorithm

To check whether two strings are permutations of each other, we can check if they are equal after sorting. To check whether an array contains only strings that are permutations of each other, we take the first element of the array and apply the above procedure to each other string in the array.

For each $125874 \leq n \leq N$, we create an array of the first K multiples of n . We use the described procedure to check if they all contain the same digits. To speed this up, we only proceed with n if n and Kn contain the same number of digits. A further optimization is to check that each digit of n is unique.