Problem 77 - Counting Summations

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This document originally appeared as a blog post on my website. Find it at gautammanohar.com/euler/77.

1 Problem Statement

It is possible to write 10 as the sum of primes in exactly 5 different ways:

$$\begin{aligned} 10 &= 7 + 3 \\ &= 5 + 5 \\ &= 5 + 3 + 2 \\ &= 2 + 2 + 1 \\ &= 3 + 3 + 2 + 2 \\ &= 2 + 2 + 2 + 2 + 2 \end{aligned}$$

How many ways can N be written as the sum of primes?

2 My Algorithm

Please see my solution to Project Euler 31, as we use the same dynamic programming techniques. This problem is a variant on the coin sum problem in Euler 31. Here the coins take on the values of the primes up to N. There are about $\frac{N}{\log N}$ primes up to N. Our solution has time complexity $O(\frac{N^2}{\log N} + T)$.