Project Euler #506

The sequence has a period of 15 ().

If we look at the 15 elements, we can see a pattern:

|  |  |
| --- | --- |
| n | Vn |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 32 |
| 6 | 123 |
| 7 | 43 |
| 8 | 2123 |
| 9 | 432 |
| 10 | 1234 |
| 11 | 32123 |
| 12 | 43212 |
| 13 | 34321 |
| 14 | 23432 |
| 15 | 123432 |

|  |  |
| --- | --- |
| n | Vn |
| 16 | 1**234321** |
| 17 | 2**343212** |
| 18 | 3**432123** |
| 19 | 4**321234** |
| 20 | 32**123432** |
| 21 | 123**432123** |
| 22 | 43**212343** |
| 23 | 2123**432123** |
| 24 | 432**123432** |
| 25 | 1234**321234** |
| 26 | 32123**432123** |
| 27 | 43212**343212** |
| 28 | 34321**234321** |
| 29 | 23432**123432** |
| 30 | 123432**123432** |

Suppose we want to find the sum of the first  elements of the clock sequence.

Let , we should sum the first  cycles and the next  elements.

Let  be the first 15 elements, and  be the incrementing part of those elements.

Let . The sum of the first q cycles consists of two parts:

1) The base part, 2) The incremental part.

1) 

2) 



For the residue, we have:



We will do all these calculations modulo , we need to find the inverse of  in .