*Roman to Integer*

*Description:*

Roman numerals are represented by seven different symbols: I, V, X, L, C, D, and M.

|  |  |
| --- | --- |
| *Symbol* | *Value* |
| I | 1 |
| V | 5 |
| X | 10 |
| L | 50 |
| C | 100 |
| D | 500 |
| M | 1000 |

For example, two can be written as II in Roman Numeral, just two one’s added together. Twelve is written as, XII, which is simply X + II. The number twenty seven is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we abstract it making four. The same principle applies to the number nine, which is written as IX.

*Principle:*

* *I can be placed before V ( 5 ) and X ( 10 ) to make 4 and 9.*
* *X can be placed before L ( 50 ) and C ( 100 ) to make 40 and 90.*
* *C can be placed before D ( 500 ) and M ( 1000 ) to make 400 and 900.*

Given a Roman Numeral, convert it to an Integer Number. Input is guaranteed to be within range from 1 to 3999.

*Example 1:*

Input: ‘III’; Output: 3

*Example 2:*

Input: ‘IV’; Output: 4

*Example 3:*

Input: ‘IX’; Output: 9

*Example 4:*

Input: ‘LVIII’; Output: 58

*Example 5:*

Input: ‘MCMXCIV’; Output: *M* + *CM* + *XC* + *IV* = 1000 + 900 + 90 + 4 = 1994.

*Analyze:*

Legal Subtraction -

|  |  |  |
| --- | --- | --- |
| IV - 4 | XL - 40 | CM - 400 |
| IX - 9 | XC - 90 | CD - 900 |

*class Solution {*

*public:*

*int romanToInt(string s) {*

*map<char, int> romanInt;*

*romanInt['I'] = 1;*

*romanInt['V'] = 5;*

*romanInt['X'] = 10;*

*romanInt['L'] = 50;*

*romanInt['C'] = 100;*

*romanInt['D'] = 500;*

*romanInt['M'] = 1000;*

*int size = s.length();*

*int sum = 0;*

*// Go through each element of the array.*

*for ( int i = 0; i < size; i ++ )*

*{*

*// Solve three situations of substraction.*

*// First, the character equals to 'I'.*

*if ( s[i] == 'I' && s[i + 1] == 'V' ) {*

*sum = sum + romanInt['V'] - romanInt['I'];*

*i = i + 1;*

*continue;*

*}*

*if ( s[i] == 'I' && s[i + 1] == 'X' ) {*

*sum = sum + romanInt['X'] - romanInt['I'];*

*i = i + 1;*

*continue;*

*}*

*// Second, the character equals to 'X'.*

*if ( s[i] == 'X' && s[i + 1] == 'L' ) {*

*sum = sum + romanInt['L'] - romanInt['X'];*

*i = i + 1;*

*continue;*

*}*

*if ( s[i] == 'X' && s[i + 1] == 'C' ) {*

*sum = sum + romanInt['C'] - romanInt['X'];*

*i = i + 1;*

*continue;*

*}*

*// Third, the character equals to 'C'.*

*if ( s[i] == 'C' && s[i + 1] == 'D' ) {*

*sum = sum - romanInt['C'] + romanInt['D'];*

*i = i + 1;*

*continue;*

*}*

*if ( s[i] == 'C' && s[i + 1] == 'M' ) {*

*sum = sum - romanInt['C'] + romanInt['M'];*

*i = i + 1;*

*continue;*

*}*

*// Solve other situations of addition.*

*sum = sum + romanInt[s[i]];*

*}*

*return sum;*

*}*

*};*