

Integer to Roman

12. Integer to Roman

Medium

5905

5170

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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, 2 is written as **II** in Roman numeral, just two one's added together. 12 is written as **XII**, which is simply **X** + **II**. The number 27 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 subtract it making four. The same principle applies to the number nine, which is written as **IX**. There are six instances where subtraction is used:

- 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 an integer, convert it to a roman numeral.

Traverse

| Symbol | Value |
|--------|-------|
| I | 1 |
| IV | 4 |
| V | 5 |
| IX | 9 |
| X | 10 |
| XL | 40 |
| L | 50 |
| XC | 90 |
| C | 100 |
| CD | 400 |
| D | 500 |
| CM | 900 |
| M | 1000 |

Lower 10th multiple of 50 is 40

Lower 100th multiple of 500 is 400.

Subtraction:-

Given : $n \Rightarrow 2656$ map \leftarrow pair $\langle \text{int}, \text{string} \rangle$

check if $2656 > 1000$
 \downarrow True

ans = mm DCCCLVI

$n = n - \text{map}[i].\text{first}$

1656 True At every True

ans = ans + map[i].second

$n = n - 1000$

$n = 656$ false

$i++$, 900 (false), 500 (True),
 $n = n - 500$

$n = 156$

400 (false), 100 (True)
 $n = 156 - 100$
 $n = 56$

90(False), 50(True)

$$n = 56 - 50$$

$$n = 6$$

40(False), 10(False), 9(False)

5(True)

$$n = 6 - 5$$

$$n = 1$$

4(False) (1) True

$$n = 0$$

return ans