

## Roman numeral to integer

To convert a Roman numeral string  $s$  into an integer, here's the key idea:

**[Core logic:]** Roman numerals are usually additive: "XII" =  $10 + 1 + 1 = 12$ .  
But when a smaller value appears before a larger one, it's subtractive: "IV" =  $5 - 1 = 4$ .

### **[Strategy:]**

- Map each symbol to its integer value.
- Iterate left to right: For each character, look ahead one character.
  - If the current value is less than the next one, subtract it.
  - Otherwise, add it.

### **[Example "MCMXCIV"]**

Char	Value	Next Char	Next Value	Action	Result
M	1000	C	100	add	1000
C	100	M	1000	subtract	$1000 - 100 = 900$
M	1000	X	10	add	1900
X	10	C	100	subtract	$1900 - 10 = 1890$
C	100	I	1	add	1990
I	1	V	5	subtract	$1990 - 1 = 1989$
V	5	-	-	add	1994

**[Helper Map:]** use a hash map like:

unordered\_map<char, int> roman = { {'I', 1}, {'V', 5}, {'X', 10}, {'L', 50},  
{ 'C', 100}, {'D', 500}, {'M', 1000} };

**[Pseudo code:]** int total = 0;

for each index  $i$  from 0 to  $s.length() - 1$ :

value = roman[s[i]]

if  $i < s.length() - 1$  and  $value < s[i+1]$ :

$total -= value$

else:

$total += value$