

- Put EVERYTHING IN PUBLIC GIT HUB REPO
- INCLUDES NOTES / DOCUMENTATION.

Convert Roman Numbers TO DECIMAL.

- 7 BASIC NUMERALS

I = 1

V = 5

USE MODULO

X = 10

L = 50

C = 100

D = 500

M = 1000

4 RULES:

1. Values COMBINED BY ADDING TOGETHER

$$\begin{array}{r} C \quad L \quad X \quad V \\ 100 + 50 + 10 + 5 = 165 \end{array}$$

2 SUBTRACTION

Given AB
if $(A < B)$

$$B - A = \text{TOTAL}$$

$$\begin{array}{r} IV = 4 \\ - 1 + 5 \end{array}$$

maybe if we
see that the
next number is
greater, we can
negate the most recent.

$$\begin{array}{r} XL = 40 \\ - 10 + 50 = 40 \end{array}$$

$$\begin{array}{r} XC = 90 \\ 10 \quad 100 = 90 \end{array}$$

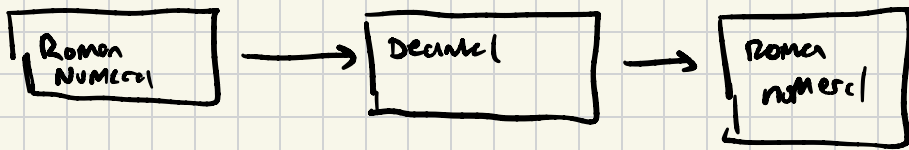
3. Subtraction only ever involves two symbols.

$$\begin{array}{r} XIV = 14 \\ 10 + [4] \end{array}$$

$$\begin{array}{r} XCIV = 94 \\ [-10 + 100] + [1 + 4] \end{array}$$

4. A symbol representing $10x$ may not precede any symbol larger than $10x+1$

$$XC$$



Compare the two Roman Numerals
Strings.

Start By Making A Map Where Define
All The Constants

C L X V
[100][50][10][5]

it might not be the most efficient, because
we need to traverse twice

It allows for the subtraction rule though.

OKAY SO ONCE WE HAVE
THE Array, WE NEED TO PROCESS IT.

Over the Array

```

for (int i = 0; i < length - 1; i++)
    if (num[i] < num[i + 1])
        num[i] = num[i] * -1; // Subtract.
  
```

0 1 2 3 length: 4
 C L X V
 [100] [50] [10] [5]
 ↑

165 % 100

Num = num % 1000

165 % 1000 = 165
 └──────────────────┘
 SAME SO Don't Append

165 % 100 = 65
 └──────────────────┘
 Different, so Append

65 % 50 = 15 → Append

15 % 10 = 5 → Append

5 % 5 =

0	1	2	3	4	5	6	7	8	9	10
	I	II	III	IV	V	VI	VII	VIII	IX	X

$$165 \% 100 = 65$$

C

$$65 \% 50 = 15$$

CL

$$15 \% 10 = 5$$

CLX

$$5 \% 5 = 0$$

CLXV

$$20 \% 50 = 20$$

$$24 \% 50 = 24$$

$$20 \% 10 = 0$$

$$24 \% 10 = 4$$

$$20 / 10 = 2$$

$$24 / 10 = 2$$

for (i: 2)

for (i: 2)

Append X

Append X

$$4 \% 5 = 4$$

CLXIV

164

$$164 \% 100 = 64$$

C

$$64 \% 50 = 14$$

CL

$$14 \% 10 = 4$$

CLX

$$4 \% 5 = 4$$

4

$$XIV = 14$$

$$14 \% 1000 = 14$$

$$14 \% 100 = 14$$

$$14 \% 50 = 14$$

$$14 \% 10 = 4$$

X

$$4 \% 5 = 4$$

If the modulo returns 0,
it means we can describe
the number using only those
symbols

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
 I II III IV V VI VII VIII IX X XI XII XIII XIV XV XVI XVII XVIII XIX XX

$$19 \% 10 = 9 \rightarrow X$$

Maybe we should use the $10x$ and $10x + 1$ rule.

Think about it as we're trying to divide the numbers into chunks that sum together to the end number.

$$19 = 10 + 9$$

X IX

$$90 = 50 + 10 + 10 + 10$$

WE WANT 10 USB BIGGEST CHUNKS
 First

THE BIGGEST CHUNK WE CAN USE
 IS

1000

III IV

XXX

1 - 5

5 - 10

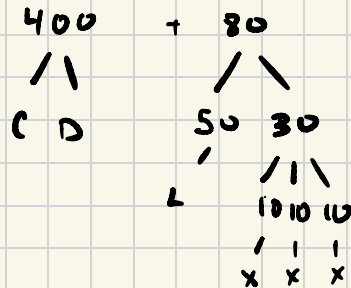
10 - 50

50 - 100

100 - 500

500 - 1000

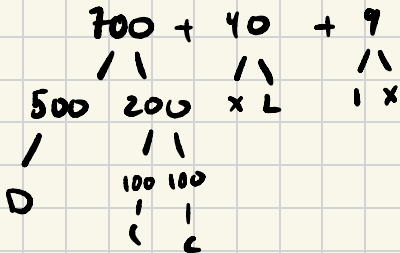
480



C D L X X X

749

700



D C C X L X

Keep breaking the number till we have
chunks we know what to do with.

$$\begin{array}{r} 700 \rightarrow \\ \swarrow \searrow \\ 500 \quad 200 \end{array}$$

$$700 \% 500 = 200$$

$$\begin{array}{c} \times \quad \text{L} \quad \vee \quad \text{||} \\ \text{L} \quad \text{---} \quad \text{L} \end{array} = 47$$

$$\begin{array}{r} \text{|||} \\ \text{---} \\ 0 \text{ } 1 \text{ } 2 \end{array}$$

compare + negate

$$i + 1 = 2$$

$$2 < \text{length}$$