Sept 2 Slides

Sidebar: Set Cover Problem

A very famous and useful problem in combinatorics and CS! One of the original problems to be proven **NP-Complete.**

One Example: Given a **"universe"** U (big set with everything else in the problem inside) and a set of sets, S

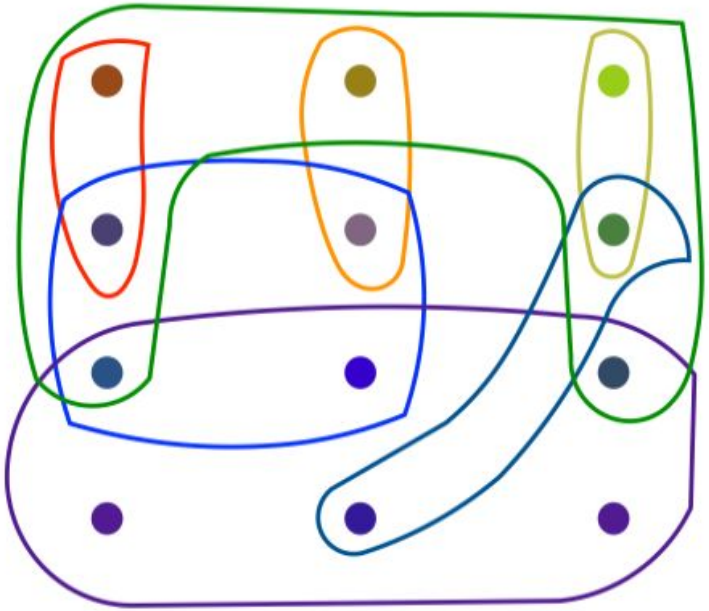
$$U = \{1, 2, 3, 4, 5\}$$

$$S = \{ \{1, 2, 3\}, \{2, 4\}, \{3, 4\} \{4, 5\} \}$$

What is the *minimum number* of sets in S needed to cover everything in U ?

Sidebar: Set Cover Problem

Your turn!



Input

???

Output

Sidebar: Set Cover Problem

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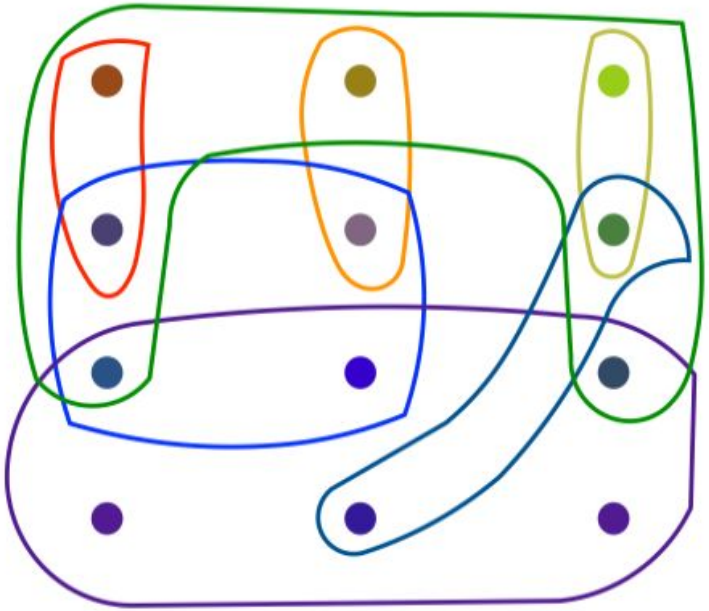

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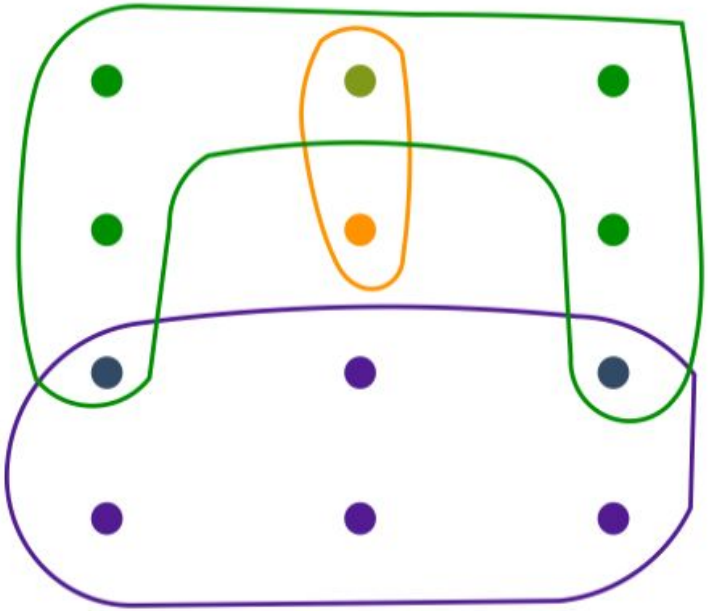


Output

∪, ∩, \, C

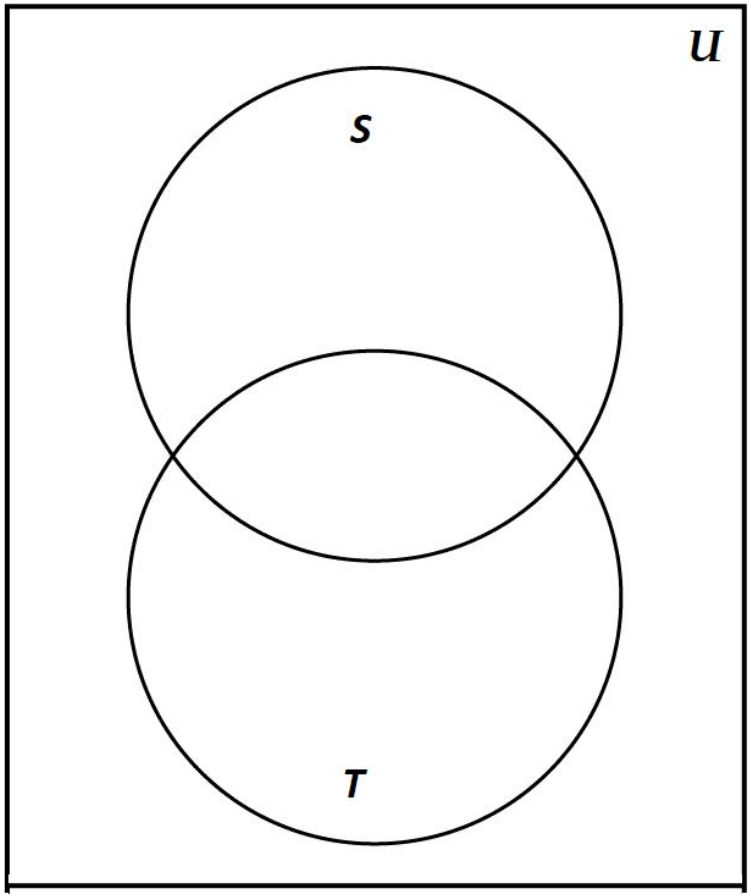
∪ “union”

∩ “intersect”

\ “difference”

A^c “complement

In mathematics, the **intersection** of two sets S and T, denoted by S ∩ T, is the set containing all elements of S that also belong to T (or equivalently, all elements of T that also belong to S)



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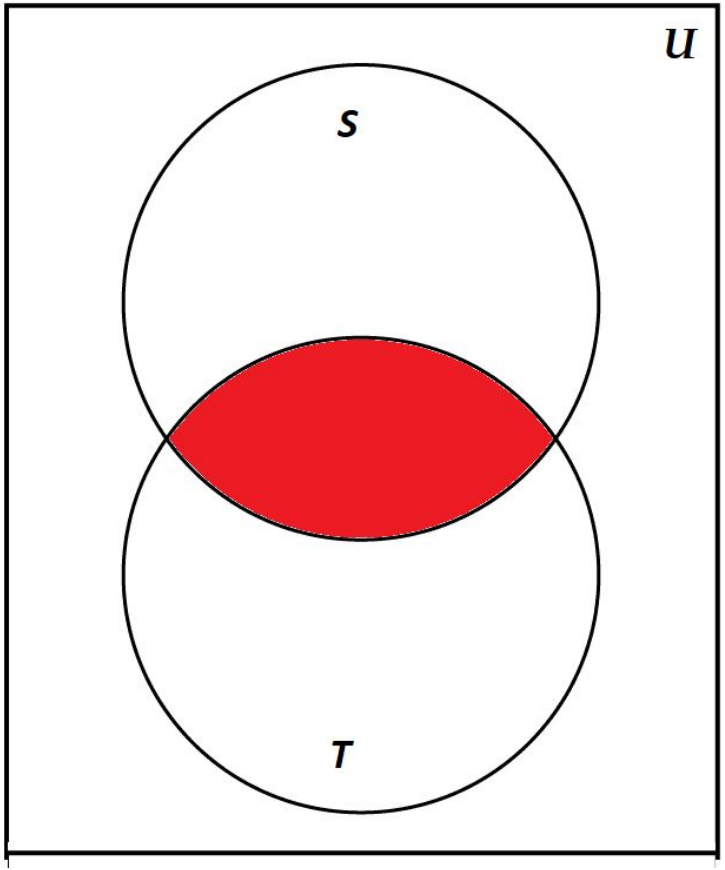
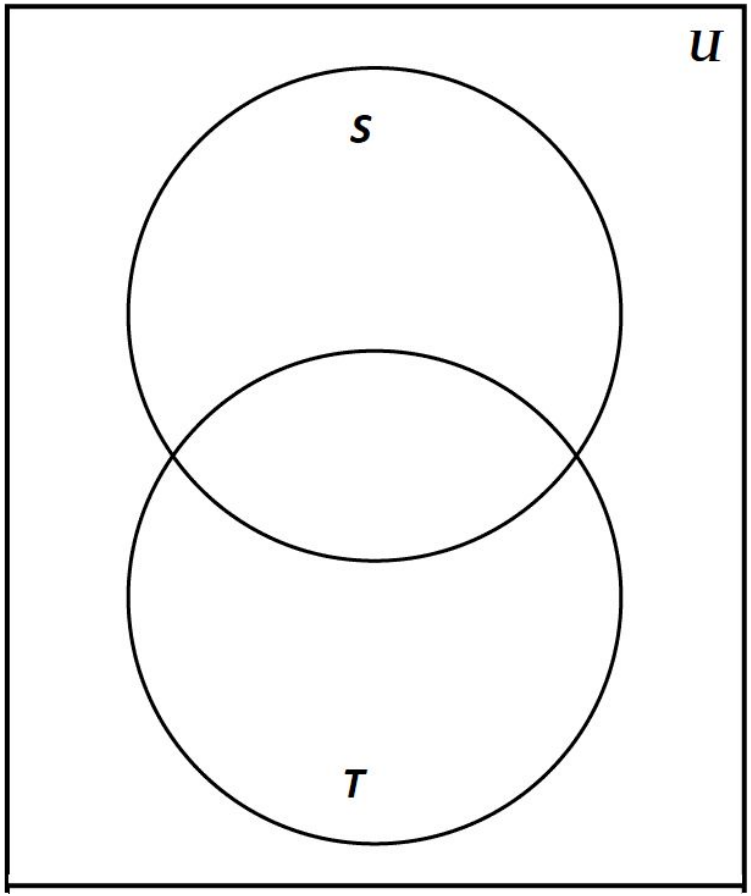


Union $S \cup T$: the elements that belong either to S or to T (or both).



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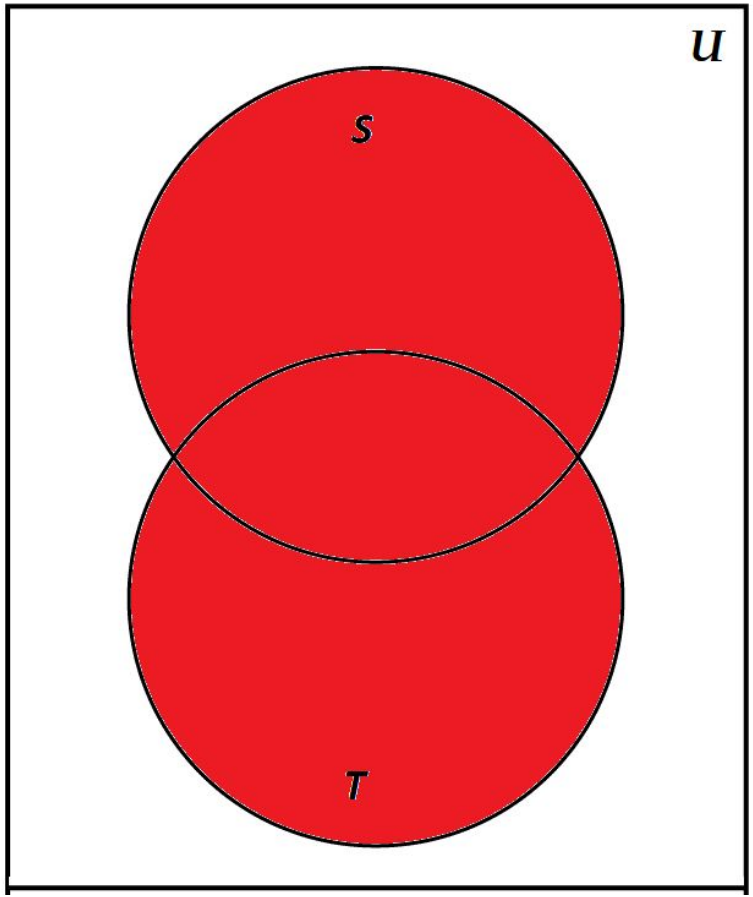
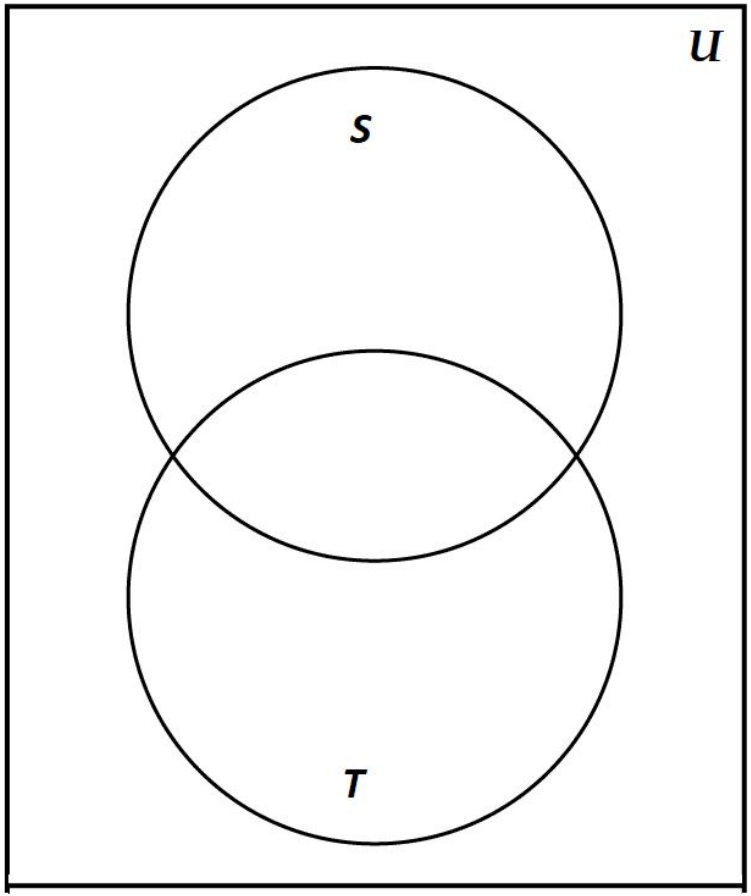


Difference $S \setminus T$: the elements that belong to S but not to T.



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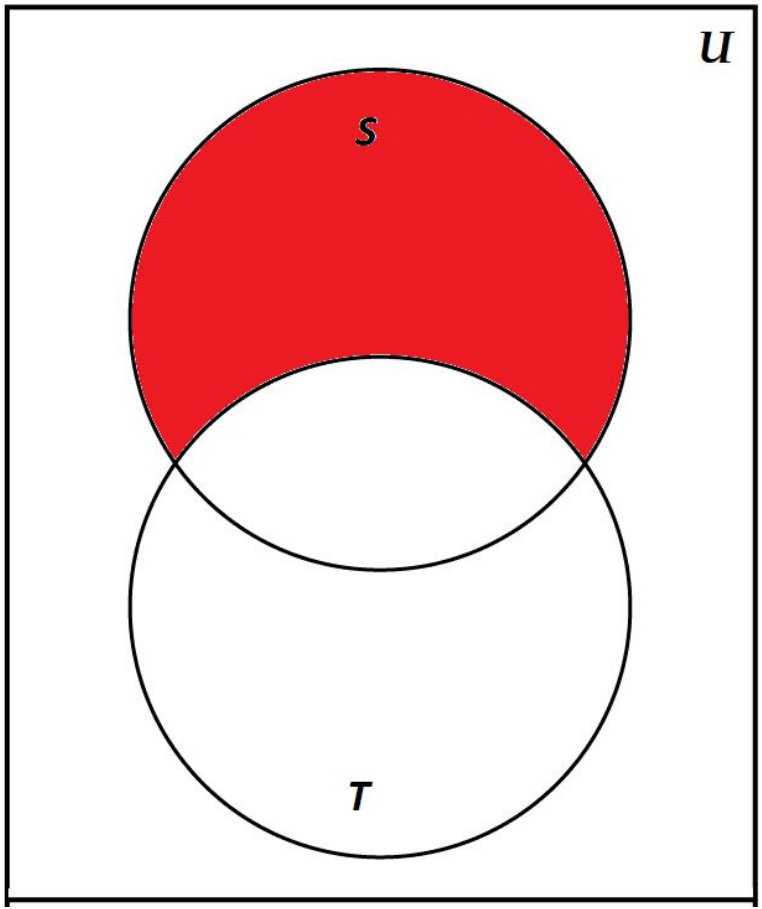
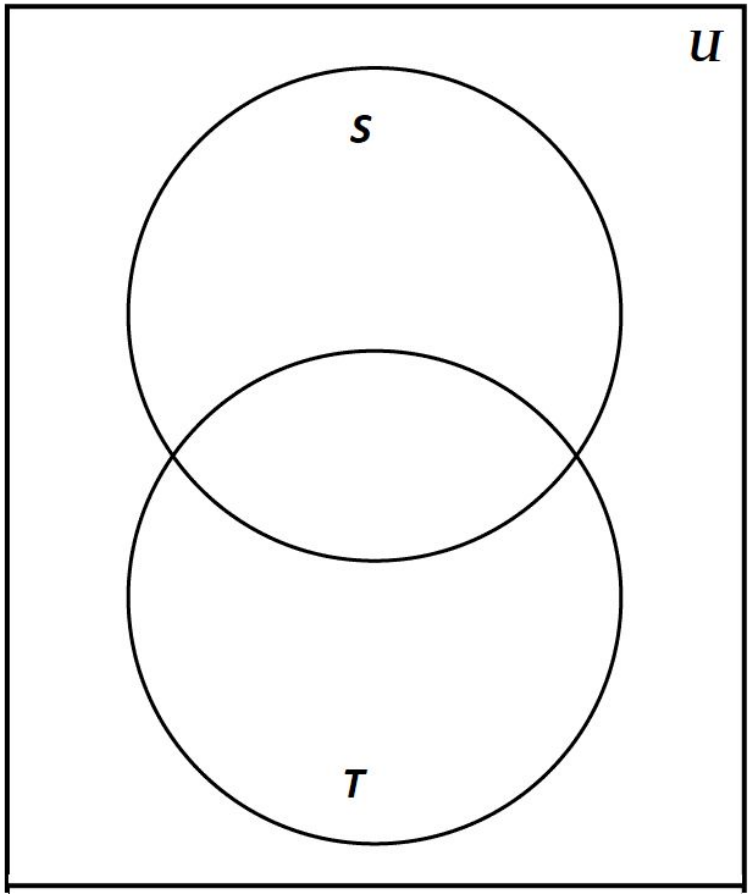


Complement $\overline{S}$: elements (of the universe) that don't belong to S.



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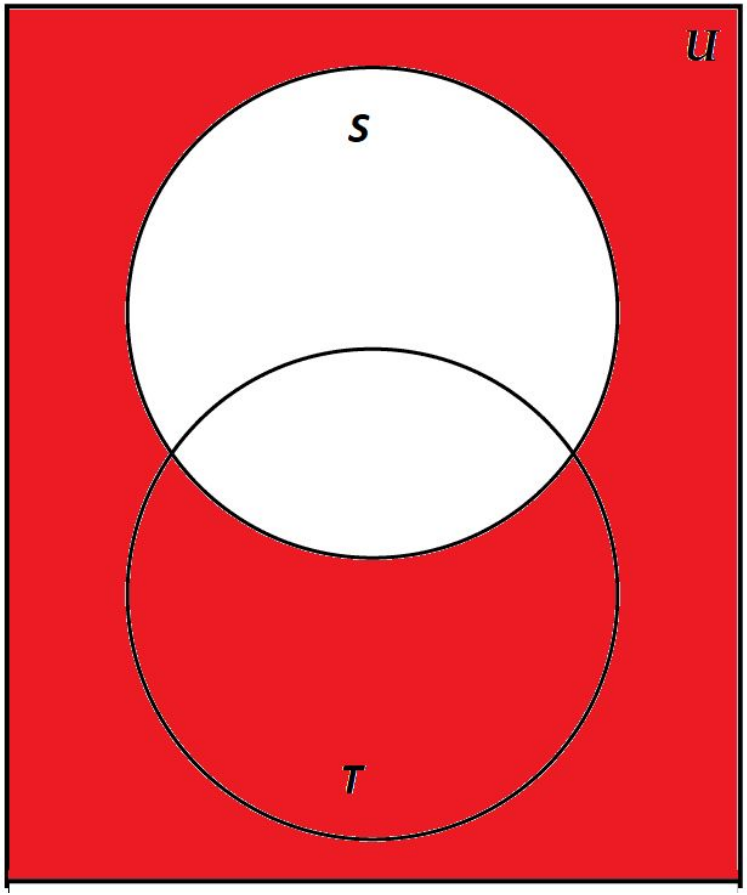

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∪ **“union”**

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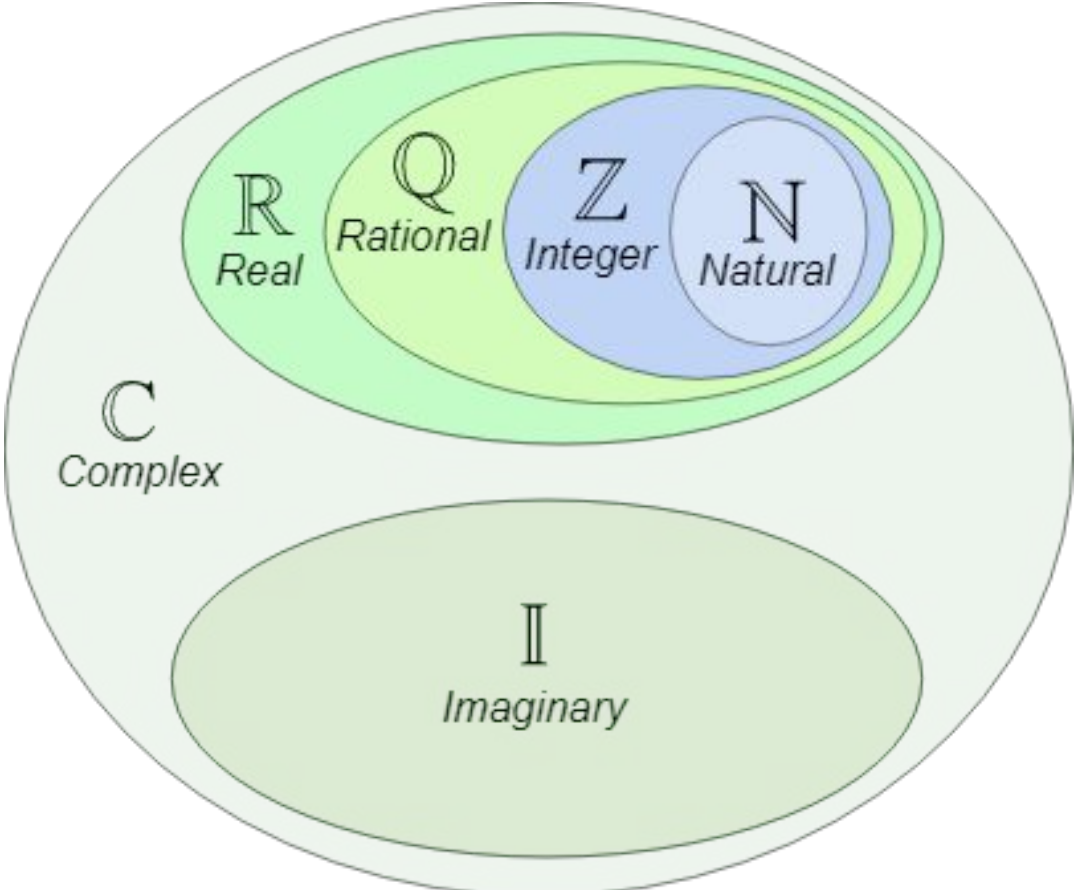
Useful Infinite Sets



Cardinality

Q: Compute each cardinality.

1. $|\{1, -13, 4, -13, 1\}|$
2. $|\{3, \{1,2,3,4\}, \varnothing\}|$
3. $|\{\}|$
4. $|\{ \{\}, \{\{\}\}, \{\{\{\}\}\} \}|$