Venn Diagrams

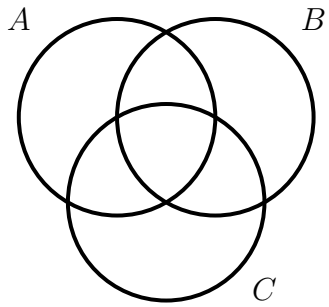
Reading Material
Discrete Mathematics Course
on Coursera

We have already discussed that the sets can be depicted by the means of Venn diagrams. This is a convenient graphic way to analyze sets when we have expressions with at most three basic sets.

Let us consider the following example:

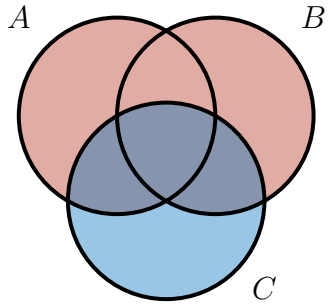
$$(C \setminus (A \cup B)) \cup (A \cap B).$$

We will visualize it on the Venn diagram for three sets:



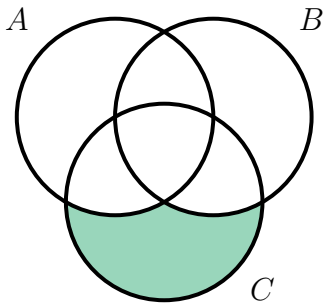
We should start from depicting simple sets and then proceed to more complicated once.

First let us draw $A \cup B$ and C.

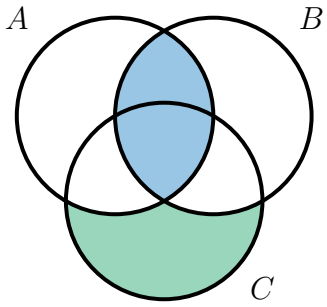


Observe that the intersectionis colored into two colors.

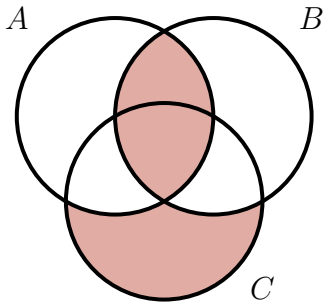
Now we can draw $(C \setminus (A \cup B))$ (the difference of two previous sets).



Now we can add $A \cap B$.



The result is the union of two sets on the previous picture.

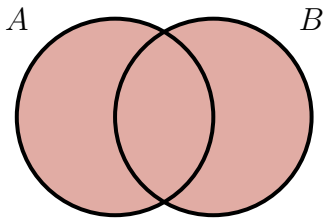


This Venn diagram depicts the set $(C \setminus (A \cup B)) \cup (A \cap B)$.

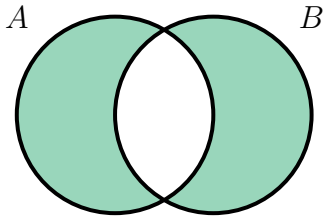
We can use Venn diagrams to analyze equivalences. Here is our example from the previous segment:

$$A \triangle B = (A \cup B) \setminus (A \cap B).$$

Indeed, let us depict $A \cup B$.



Now we can subtract $A \cap B$ and obtain $(A \cup B) \setminus (A \cap B)$.



Now observe that the picture is is the same as $A \triangle B$!

In the next segment we will discuss what does this mean from the mathematical point of view.