Introduction to Logical Reasoning

More Advanced Categorical Statements

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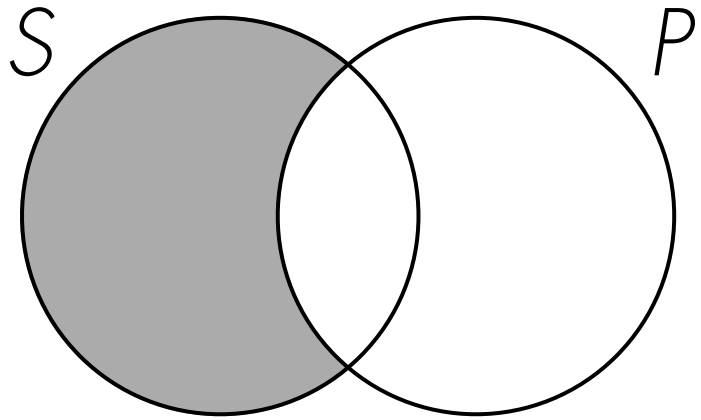
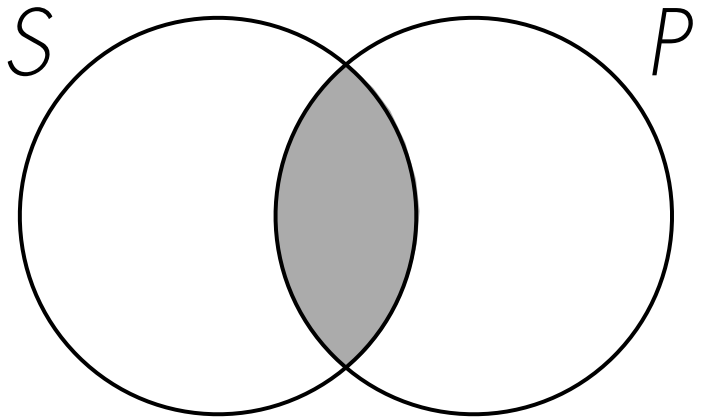
Categorical Statements

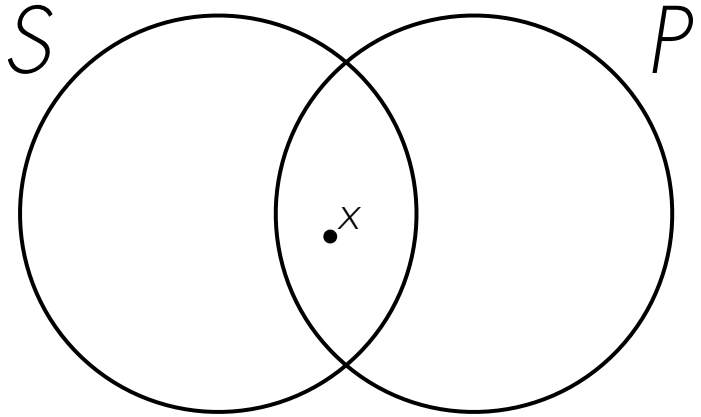
The four standard forms of categorical statements:



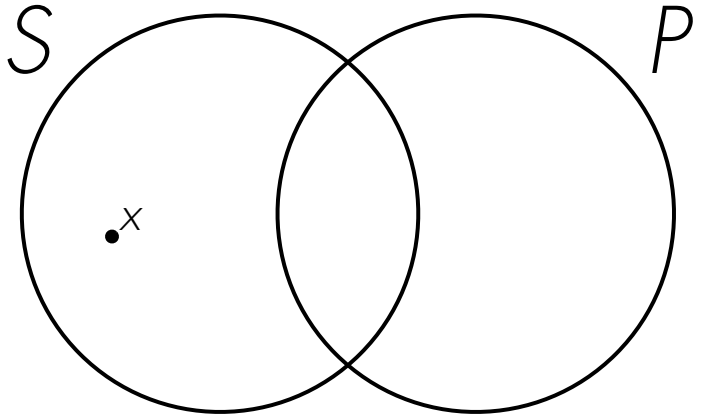
A: All *S* is *P*.



E: No *S* is *P*.



I: Some *S* is *P*.



O: Some *S* is not *P*.

Complex Statements

The categorical statements we often encounter in English require a little thought in order to recognize which of the four forms is being asserted.

Identify the Categories

When faced with a categorical claim, your first priority is to carefully identify the subject (*S*) and predicate (*P*) terms involved in the statement.

For instance, consider this categorical statement:

> No nation can survive without secure borders.

What are the two categories involved here? What is being asserted about them in this statement?

Identify the Categories

No nation can survive without secure borders.

The subject term (*S*) is nations and the predicate term (*P*) is things that can survive without secure borders.

With this laid out, it should now be easier to see that this is an **E** categorical statement:

No nations are things that can survive without secure borders. (No *S* is *P*.)

Recognize Quality and Quantity

Even if you do identify the terms, it may still be difficult to determine the type of categorical statement involved.

Recall that the basic elements determining a categorical statement are its *quality* and its *quantity*. So ask yourself:

> Does this *affirm* or *deny* a relationship between the two terms? (Quality)
>
> Does this refer to *all* things in the subject term (*S*) or just about *some* things in that category. (Quantity.)

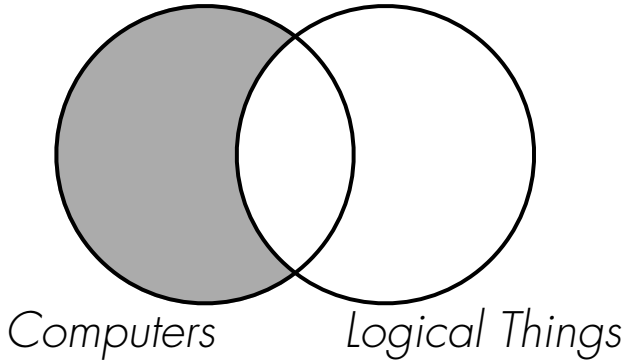
Recognize Quality and Quantity

Equivalent Universal Affirmatives (**A** statements):

Every computer is logical.

Whatever is a computer is logical.

Computers are logical.

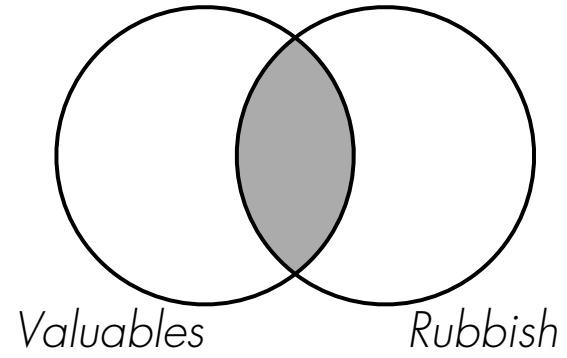


Equivalent Universal Negatives (**E** statements):

Nothing valuable is rubbish.

Valuables are not rubbish.

Whatever is valuable is not rubbish.



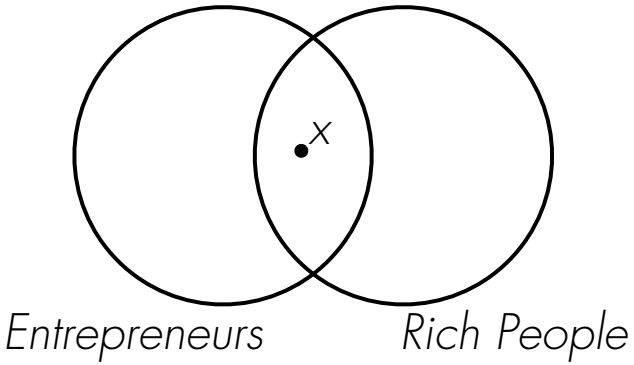
Recognize Quality and Quantity

Equivalent Particular Affirmatives (**I** statements):

A few entrepreneurs are rich.

Most entrepreneurs are rich.

There are entrepreneurs who are rich.

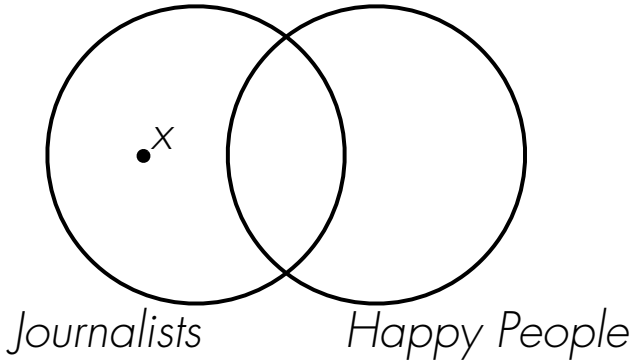


Equivalent Particular Negatives (**O** statements):

Journalists are not always happy.

Not all journalists are happy.

There are journalists who are not happy.



Singular Statements

Sometimes a statement might not seem categorical. Consider this statement:

> Shamila is a good reader.

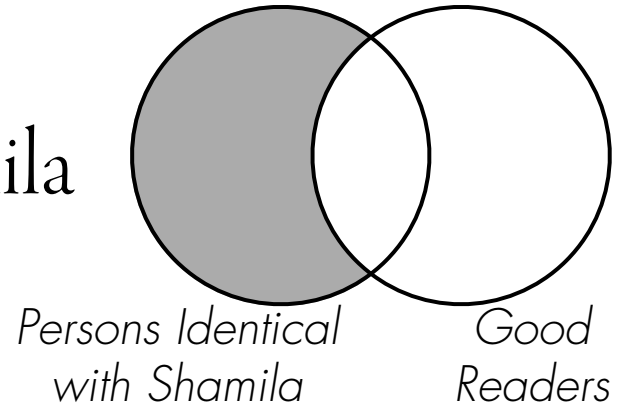
This seems to just be about one person and not a category of things at all. In general, a **singular statement** like this makes an assertion about one single, particular thing.

Singular Statements

Shamila is a good reader.

Even so, we can still work with this statement by creating a category to accommodate its singular entity, like so:

All persons identical with Shamila are good readers.



Now this is just a simple **A** statement.

"The Only" vs "Only"

Consider the following two statements:

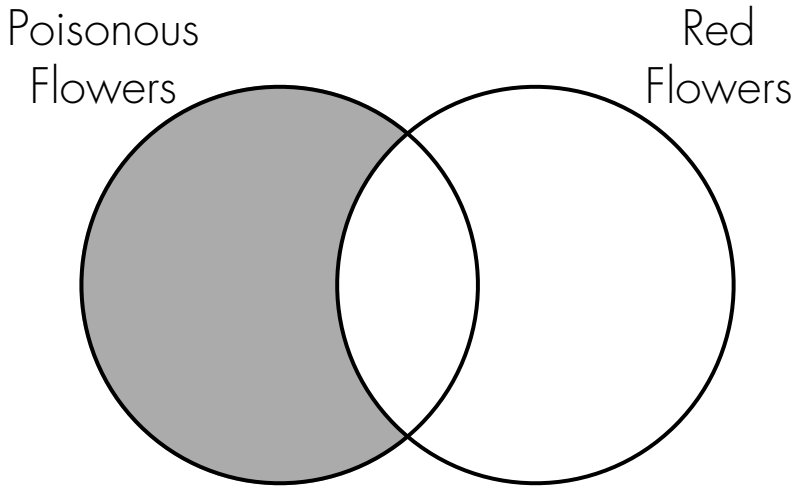
The only poisonous flowers are red flowers.

Only poisonous flowers are red flowers.

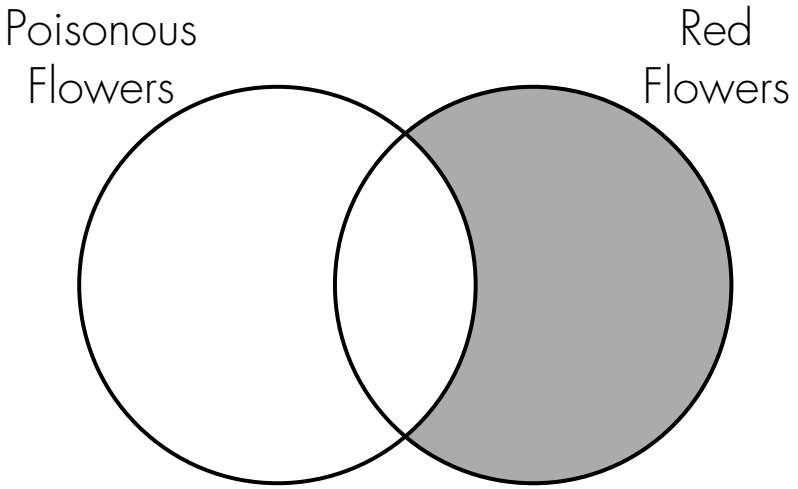
Are these just expressing the exact same thing?

(If it helps, imagine you have a red flower. Are you certain in both instances that it is poisonous?)

"The Only" vs "Only"



The only poisonous flowers are red flowers
(**A** Statement:
All poisonous flowers are red flowers.)



Only poisonous flowers are red flowers.
(**A** Statement:
All red flowers are poisonous flowers.)

It turns out that these are two very different claims!

So if you have a red flower, this makes a difference!

"The Only" vs "Only"

As general rule of thumb, the term following "the only" is usually the subject term (*S*) of an **A** statement, whereas the term following "only" is usually the predicate term (*P*) of an **A** statement.

Complement

For any subject (*S*) or predicate (*P*) in a categorical statement, we may consider its complement.

The **complement** of a category contains *everything* that is *not* in that category. The complement of the subject is denoted as "non-*S*"; the complement of the predicate is denoted as "non-*P*".

In English, for example, the complement of "students" is "non-students", while the complement of "poisonous flowers" is "non-poisonous flowers".

Complement

The use of complements allows us to consider even more sophisticated categorical statements.

For instance, consider this categorical statement:

> Some students are non-journalism majors.

What are the subject (S) and predicate (P) terms of this categorical statement?

Complement

Some students are non-journalism majors.

The subject term (*S*) is students, whereas the predicate term (*P*) is journalism majors.

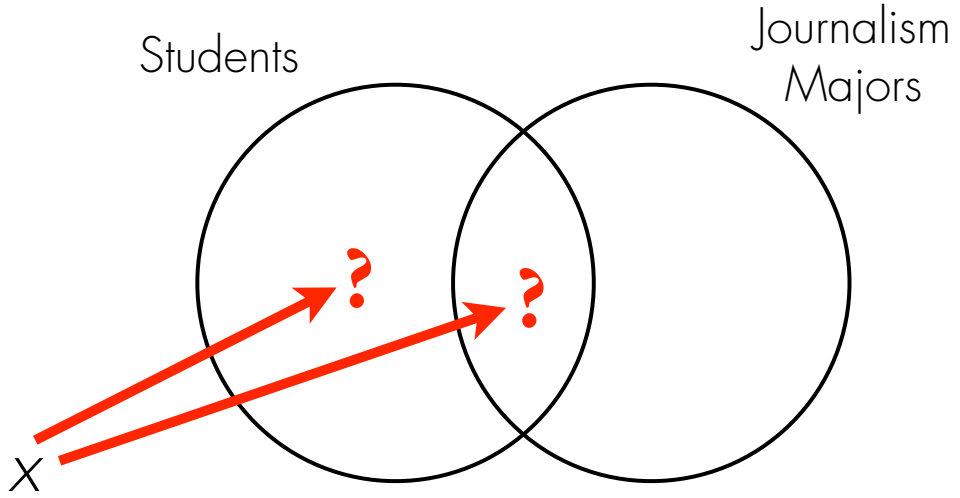
When using complements, the focus should still remain on the main categories. So instead of talking about non-journalism majors (non-*P*), keep the focus on journalism majors (*P*).

Now how do we diagram this statement?

Complement

Some students are non-journalism majors.

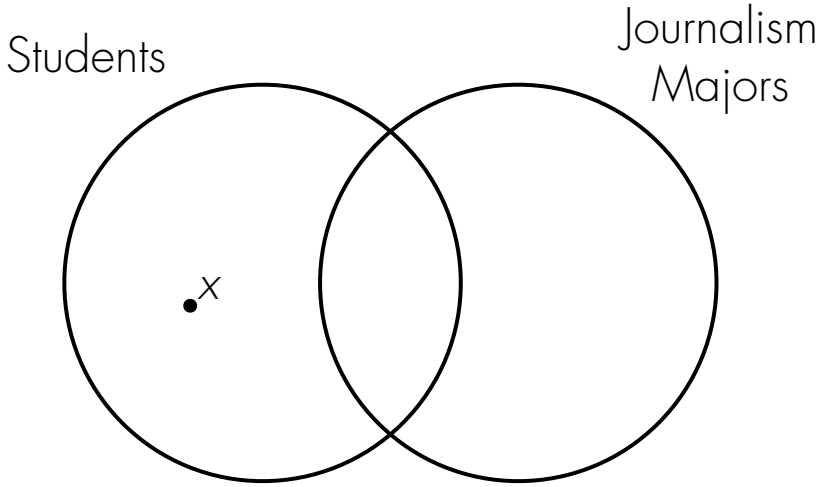
We know we are talking about "some students", which means we have to put an *x* somewhere in the student circle. But where does that *x* go?



Complement

Some students are non-journalism majors.

Well this *x* is a non-journalism major, so it must be outside the journalism major circle, meaning there is only one place it can go!



Statement 1

Draw the Venn diagram for this statement:

No non-flower is poisonous.

Statement 1

No non-flower is poisonous.

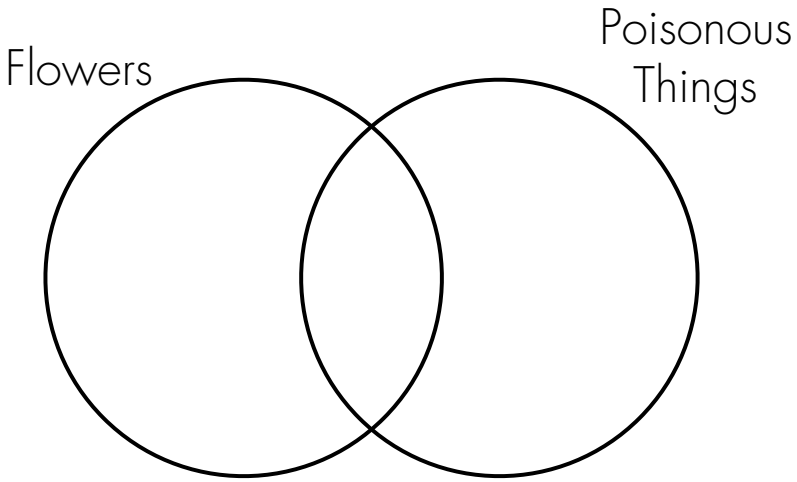
Right off, we should first recognize that the subject term (*S*) is flowers and the predicate term (*P*) is poisonous things.

We should also notice that this is an **E** statement, since there is a "No" at the beginning.

Statement 1

No non-flower is poisonous.

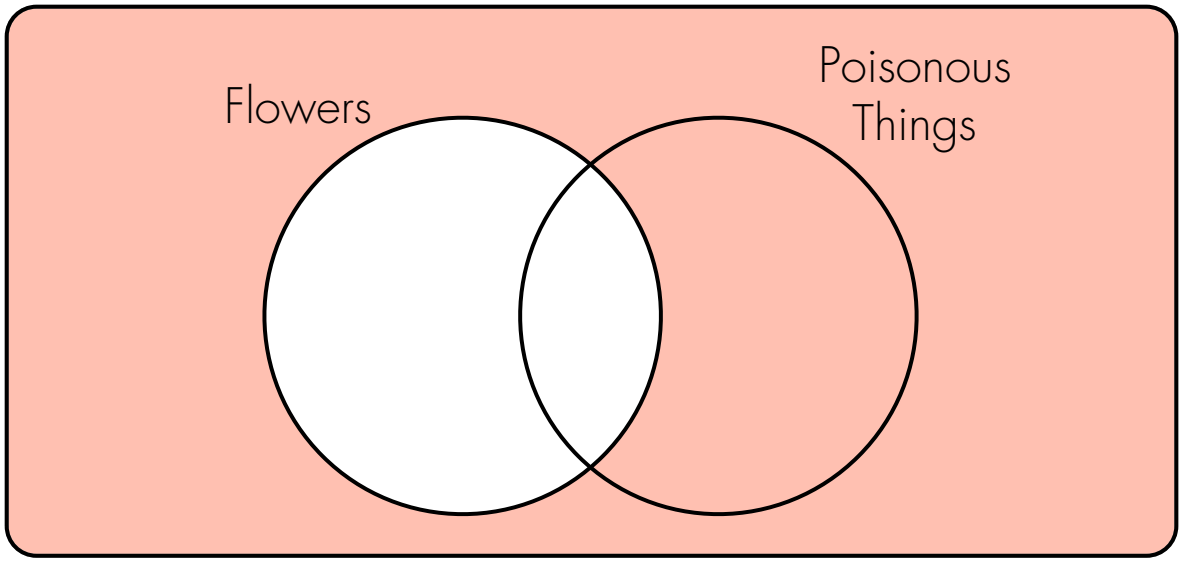
Since this is an **E** statement, we know we need to fill in an area in the diagram. But where do we fill in?



Statement 1

No non-flower is poisonous.

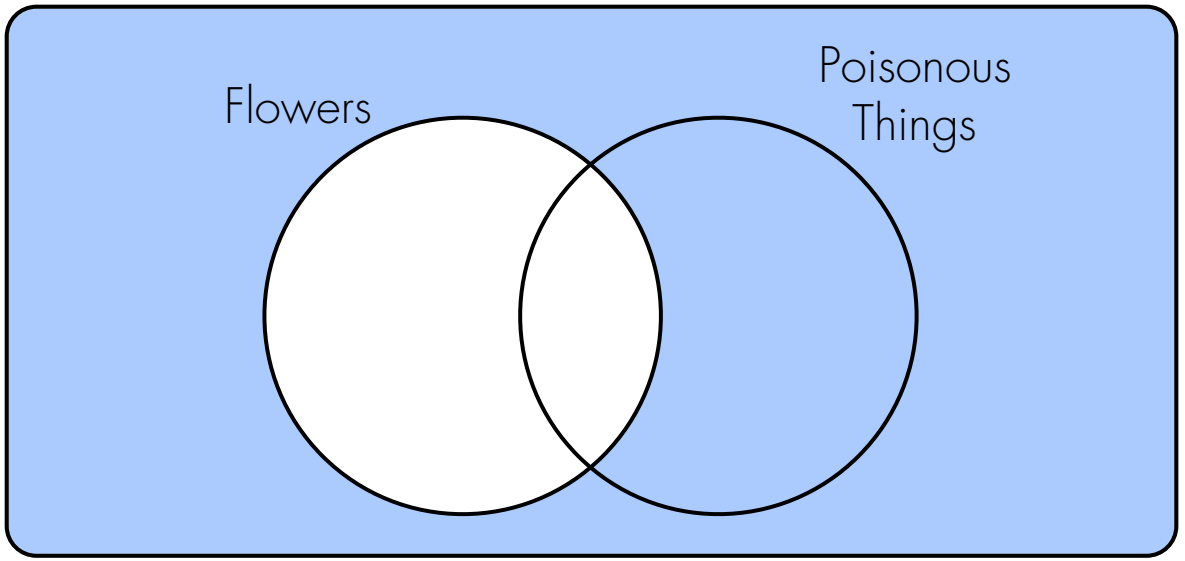
We start by looking at the non-flowers. (I've added a box to show the area outside of both categories.) What do we know about these non-flowers?



Statement 1

No non-flower is poisonous.

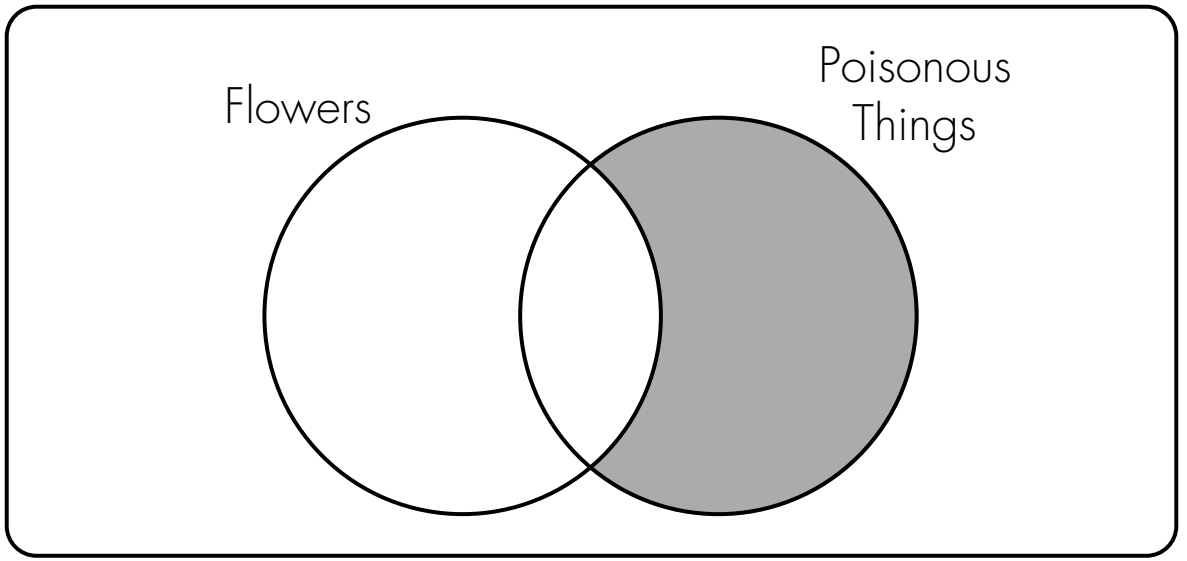
We know that none of the things in the blue area are poisonous. So which part of the blue must be empty?



Statement 1

No non-flower is poisonous.

The area involving poisonous things must be empty.
So shade it in, and all done!



Next Class…

We will have a workshop on identifying categorical statements and drawing their Venn diagrams.