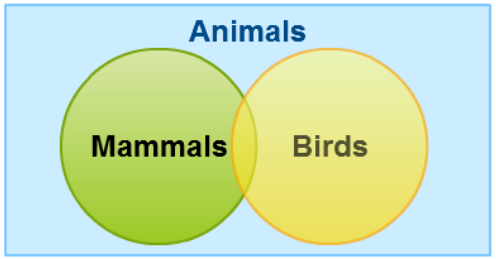
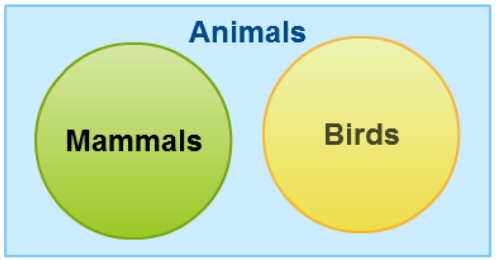
Euler vs. Venn Diagrams

Both set of diagrams are based on the set theory. A Venn diagram show **all possible logical relationships** between a collection of sets. But an Euler diagram **only shows relationships that exist in real world.**

VENN



EULER



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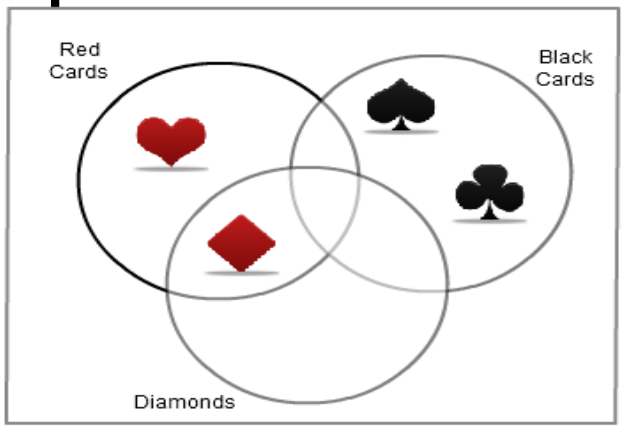
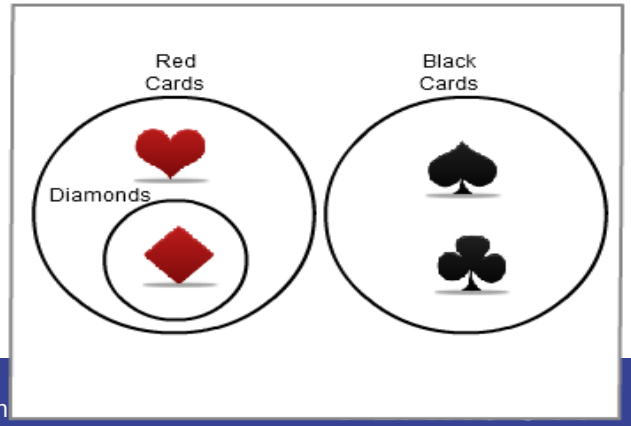


EULER



Q1: When were they invented?

Q2: Which were invented first?

Euler and Venn

Leonhard Euler

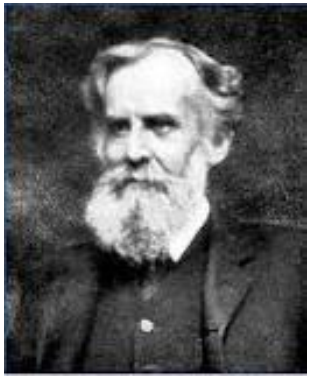
1707-1783

Swiss mathematician, physicist, astronomer, and engineer

John Venn

1759-1813

English mathematician and philosopher



Example: Using an Euler Diagram to Determine Validity (Universal Quantifier)

Is the following argument valid?

All rainy days are cloudy.

Today is not cloudy.

Today is not rainy.

Example: Using an Euler Diagram to Determine Validity (Universal Quantifier)

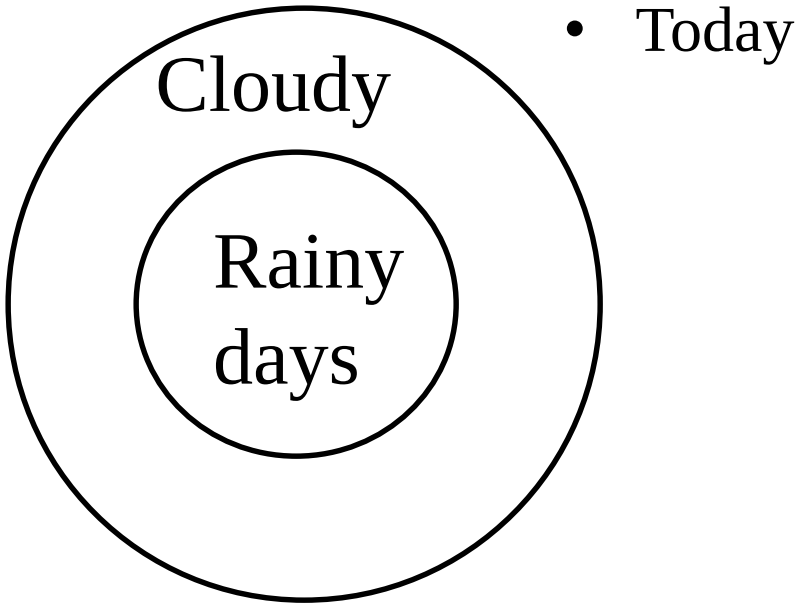
All rainy days are cloudy.

Today is not cloudy.

Today is not rainy.

Solution

"Rainy days" is inside "Cloudy". The diagram shows that "Today" is not cloudy and, therefore, not rainy. The argument is valid.



Example: Using an Euler Diagram to Determine Validity

Is the following argument valid?

All magnolia trees have green leaves.

That plant has green leaves.

That plant is a magnolia tree.

Example: Using an Euler Diagram to Determine Validity

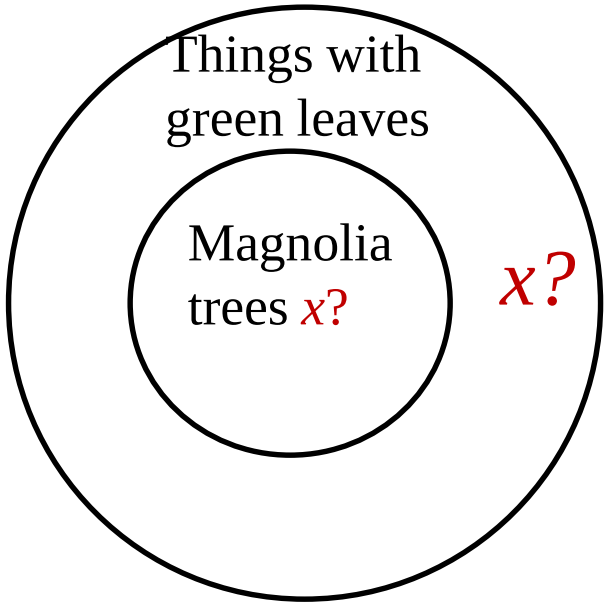
All magnolia trees have green leaves.

That plant has green leaves.

That plant is a magnolia tree.

Solution

The *x* can go either inside or outside the region for "Magnolia trees". The argument is invalid. It is a fallacy.



x represents "that plant"

Example: Using an Euler Diagram to Determine Validity

Is the following argument valid?

All expensive things are desirable.

All desirable things make you feel good.

All things that make you feel good make you live longer.

All expensive things make you live longer.

Example: Using an Euler Diagram to Determine Validity

All expensive things are desirable.

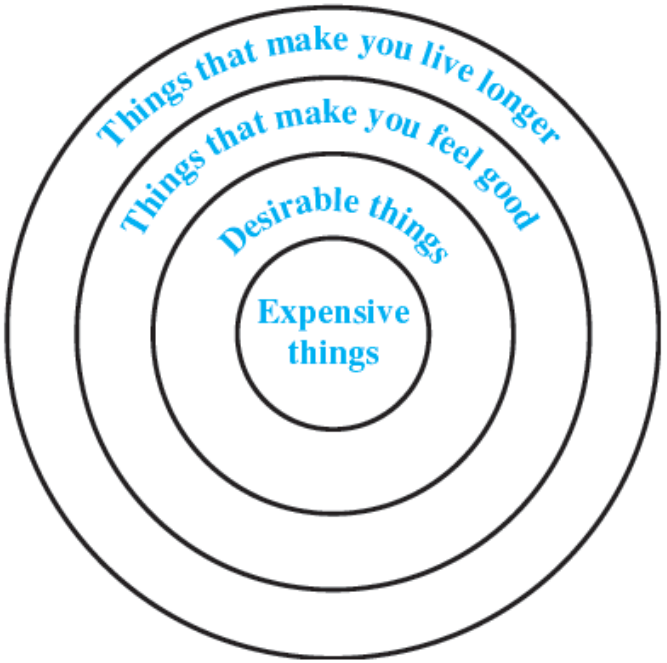
All desirable things make you feel good.

All things that make you feel good make you live longer.

All expensive things make you live longer.

Solution

If each premise is true, then the conclusion must be true because the region for "expensive things" lies completely within the region for "things that make you live longer." Thus, the argument is valid.



Example: Using an Euler Diagram to Determine Validity (Existential Quantifier)

Is the following argument valid?

Many students drive Hondas.

I am a student .

I drive a Honda.

Example: Using an Euler Diagram to Determine Validity (Existential Quantifier)

Many students drive Hondas.
I am a student .
I drive a Honda.

Solution

The diagram shows that "I" can be inside the region for "Drive Hondas" or outside it. The argument is invalid.