CRITICAL THINKING

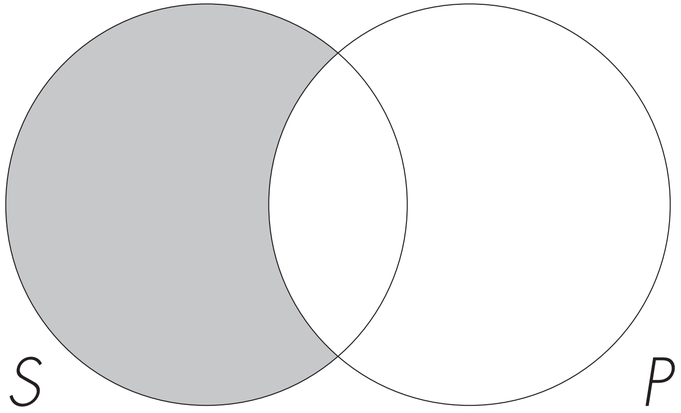
Review Session #3

Classic Categorical Logic

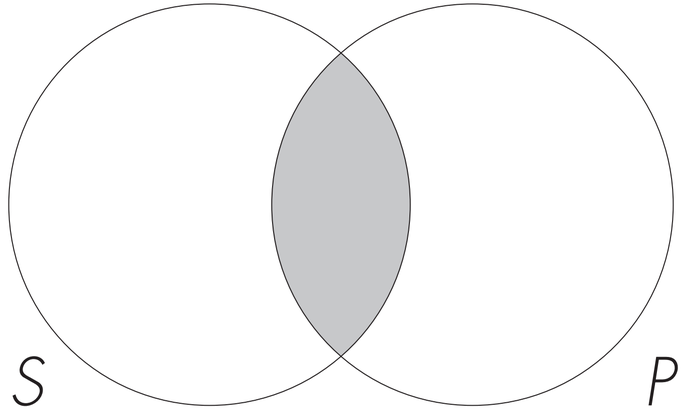
Professor David Emmanuel Gray

CARNEGIE-MELLON UNIVERSITY

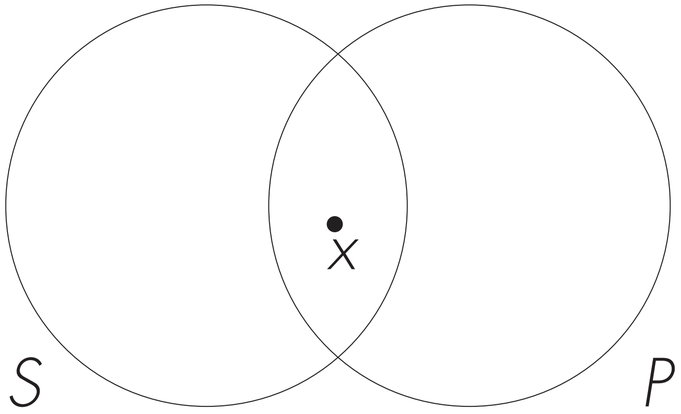
Four Standard Forms of Categorical Statements



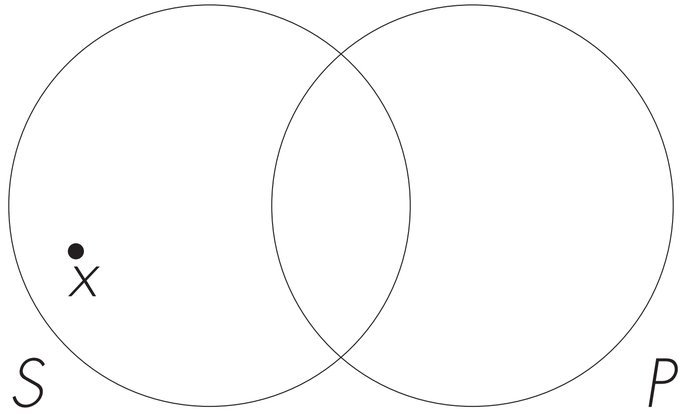
A: All *S* is *P*.
(Shade in all of *S* not shared with *P*.)



E: No *S* is *P*.
(Shade in all of *S* shared with *P*.)



I: Some *S* is *P*.
(Dot-*x* in *S* shared with *P*.)



O: Some *S* is not *P*.
(Dot-*x* in *S* not shared with *P*.)

Four Standard Forms of Categorical Statements (Generalized)

Universal Positive

A: All *X* is *Y*.

Shade in all of *X* not shared with *Y*.

Universal Negative

E: No *X* is *Y*.

Shade in all of *X* shared with *Y*.

Particular Positive

I: Some *X* is *Y*.

Dot-*x* in *X* shared with *Y*.

Particular Negative

O: Some *X* is not *Y*.

Dot-*x* in *X* not shared with *Y*.

Note: A complement like non-*S* or non-*P* can substitute *X* or *Y*.

The Skills You Have Practiced…

1. Analyzing categorical statements,
2. Making inferences from categorical statements, and
3. Assessing categorical syllogisms (≈60% of the exam).

Analyzing Categorical Statements: *Instructions*

Analyzing the logical structure of categorical statements works as follows:

1. Identify the subject term (*S*) and predicate term (*P*),
2. Identifying its logical form (**A**, **E**, **I**, or **O**),
3. Draw the Venn diagram representing it (with the subject term (*S*) on the left and the predicate term (*P*) on the right), being sure to label the parts, and
4. Explain its quality, quantity, and distribution.

Analyzing Categorical Statements: *Example #1*

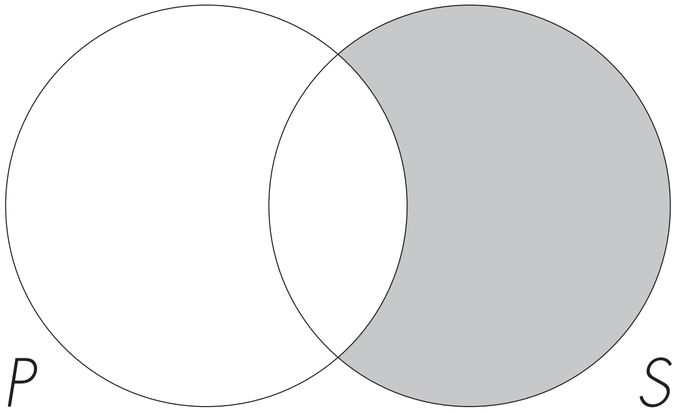
All logic students are good critical thinkers.

Analyzing Categorical Statements: *Common Problems*

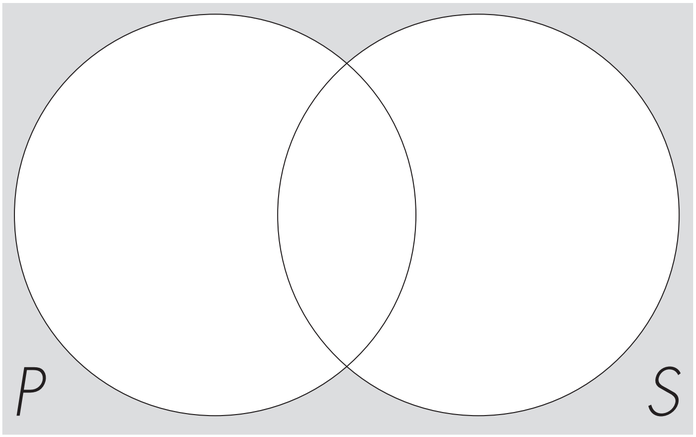
Generally, everyone seems to understand the four traditional forms (**A**, **E**, **I**, or **O**), though be on guard against mixing things up.

Beyond that, do review some of the trickier more advanced, non-traditional, forms of categorical statements. The ones involving complements (i.e., non-*S* and non-*P*) are important to remember.

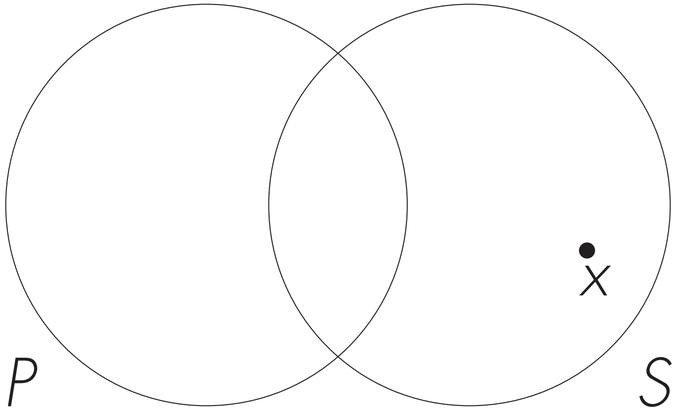
Analyzing Categorical Statements: *Examples of Non-Traditional Forms*



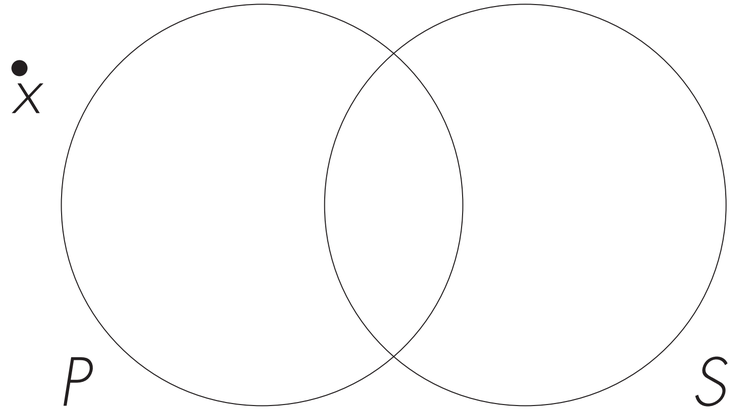
All non-*P* is non-*S*.



No non-*P* is non-*S*.



Some non-*P* is not non-*S*.



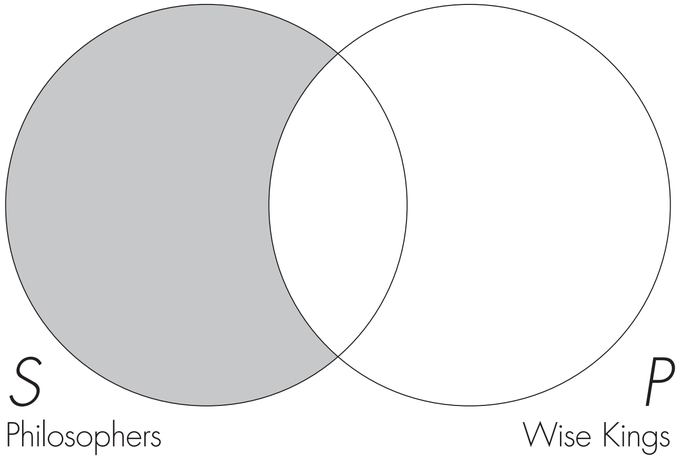
Some non-*P* is non-*S*.

Analyzing Categorical Statements: *Common Problems*

In addition, do not forget the difference between “the only” and “only”. Both establish a universal, affirmative categorical claim between the two categories, but they do so in quite different ways.

Analyzing Categorical Statements: *Only vs. The Only*

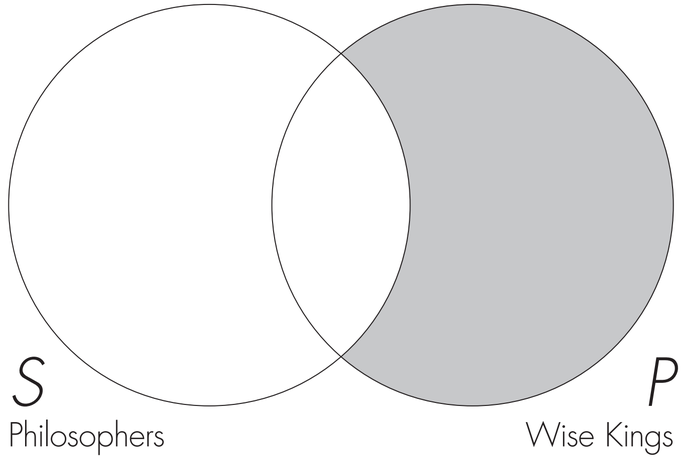
Philosophers are **only** wise kings.



All philosophers are wise kings.
(**A** Statement: All *S* are *P*.)

In this case, philosophers can "only" be one thing: wise kings. So the area of philosophers outside of wise kings must be empty.

Philosophers are **the only** wise kings.



All wise kings are philosophers.
(**A** Statement: All *P* are *S*.)

Meanwhile, over here, "the only" wise kings that you will find are philosophers. So the area of wise kings outside of philosophers must be empty.

Inferences with Categorical Statements: *Instructions*

Given that a categorical statement is true or false, draw a Venn diagram representing that statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given that Venn diagram, what can you infer about other categorical statements? That is, are these other statements true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

Inferences with Categorical Statements: *Common Problems*

Generally people often try to do too much in their heads. Just draw the Venn diagrams for everything. This will make it much easier on you to determine if the truth (or falsity) of one categorical statement tells you whether a second categorical statement is true, false, or unknown.

But do not forget to write down a clear and succinct explanation!

Inferences with Categorical Statements: *Example #1*

Assume that the following categorical statement is *true*:

All logic students are good critical thinkers.

Given the truth of this statement, what can you infer about the following categorical statement?

No non-good critical thinkers are non-logic students.

That is, is this second statement true, false, or unknown?

Assessing Categorical Syllogisms: *Instructions*

Assessing the validity of a categorical syllogism using Venn diagrams works as follows:

1. Identify the major term (*P*), the minor term (*S*), and the middle term (*M*);
2. Put the syllogism into standard symbolic form;
3. Create a Venn diagram of the premises,
4. Create a Venn diagram of the conclusion; and
5. Use those two Venn diagrams to explain whether the syllogism is valid or invalid.

(Keep in mind that it is now possible that *P*, *S*, and *M* are empty.)

Assessing Categorical Syllogisms: *Common Problems*

The most common problems are

1. (Not shading in areas correctly, and
2. Not being sure when the dot goes on a line or not.

Furthermore, be sure to draw the conclusion's Venn diagram separately, so you can check it against the premises more easily.

Assessing Categorical Syllogisms: *Example #1*

All logic students are hard workers, and so all logic students are good critical thinkers because some hard workers are good critical thinkers.

Is this a valid or invalid argument?

Next Class…

We will have **unit exam #3**.

Keep practicing! You can do this!