Introduction to Logical Reasoning

Categorical Syllogisms

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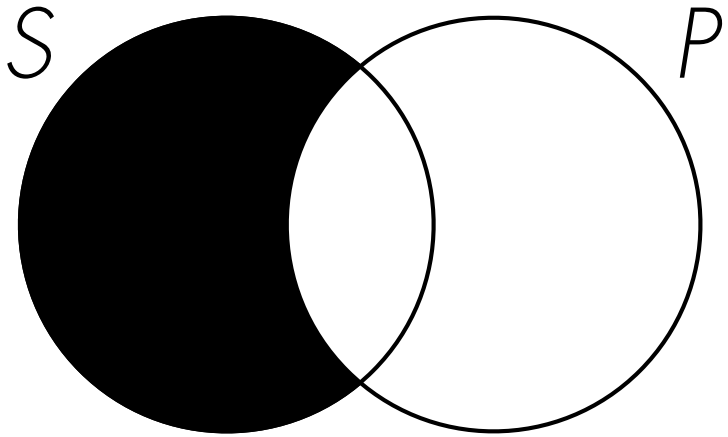
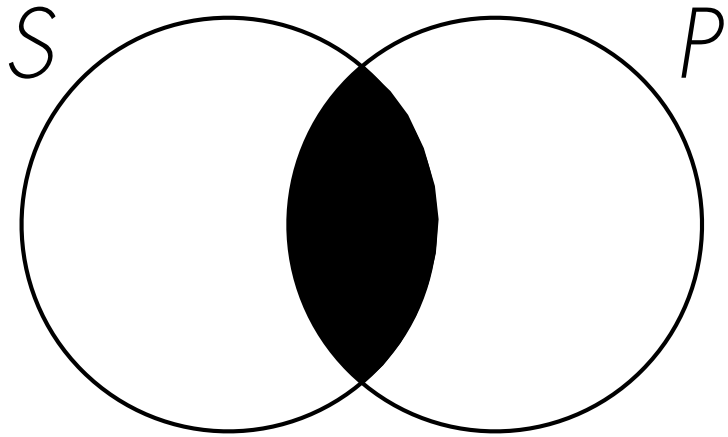
Categorical Statements

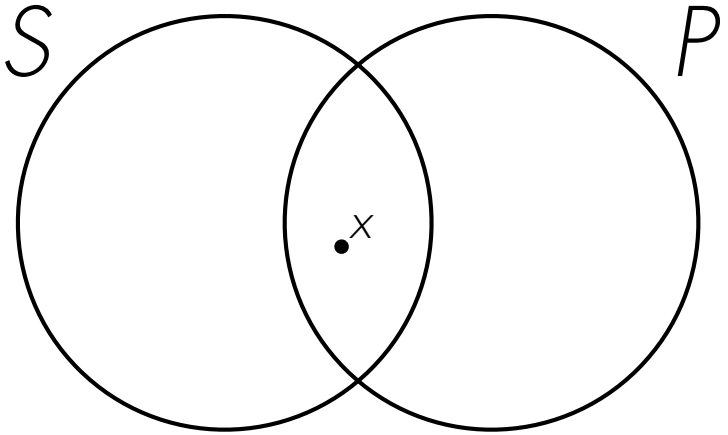
Recall the four standard forms of categorical statements:



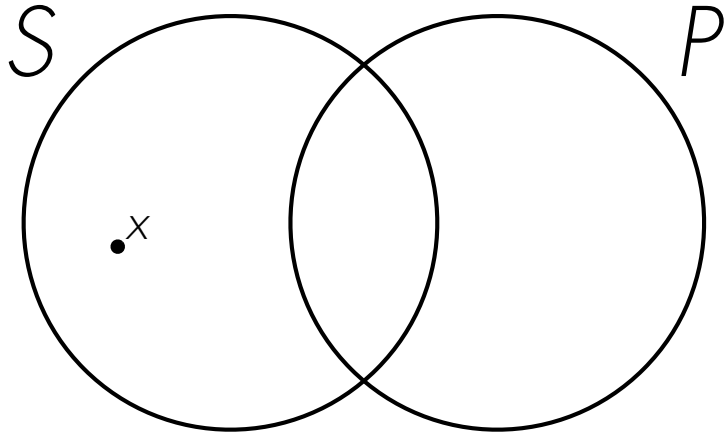
A: All *S* is *P*.



E: No *S* is *P*.



I: Some *S* is *P*.



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

Categorical Syllogisms

A categorical syllogism is an argument involves exactly three categorical statements (two premises, and one conclusion) which have a special form involving only three categories in total.

A Categorical Syllogism

Some writers are mediocre hacks, but no great journalists are mediocre hacks. As a result, some writers are not great journalists.

A Categorical Syllogism

Some writers are mediocre hacks, but no great journalists are mediocre hacks. As a result, some writers are not great journalists.

C

There are two premises here, but *I have not yet numbered them*. There is a special way for numbering the propositions in a categorical syllogism that I will explain shortly.

Some Technical Definitions

The **major term** (P) of a categorical syllogism is the predicate of the conclusion.

The **minor term** (S) of a categorical syllogism is the subject of the conclusion.

The **middle term** (M) of a categorical syllogism is the term appearing in both premises but not in the conclusion.

Standard Symbolic Form

Now we can put the argument into what I call standard symbolic form.

To do this, **first** identify the major, minor, and middle terms of the argument:

Major term (*P*): Great journalists.

Minor term (*S*): Writers.

Middle term (*M*): Mediocre hacks.

Standard Symbolic Form

Second, we number the premises of the argument:

Premise 1 is always the categorical premise that has the major term (P) in it. This is the **major premise**.

Premise 2 is always the categorical premise that has the minor term (S) in it. This is the **minor premise**.

Numbering the Premises

2Some writers are mediocre hacks, but1no great journalists are mediocre hacks. As a result, some writers are not great journalists.
C

Standard Symbolic Form

Third, symbolize the argument using these identifiers for the major, minor, and middle terms:

1. No *P* is *M*.
2. Some *S* is *M*.

∴ Some *S* is not *P*.

Putting the argument in this form will now make it easy to check its validity.

Assessing Validity

Recall that a **valid** argument is an argument where the truth of all its premises logically entails the truth of its conclusion.

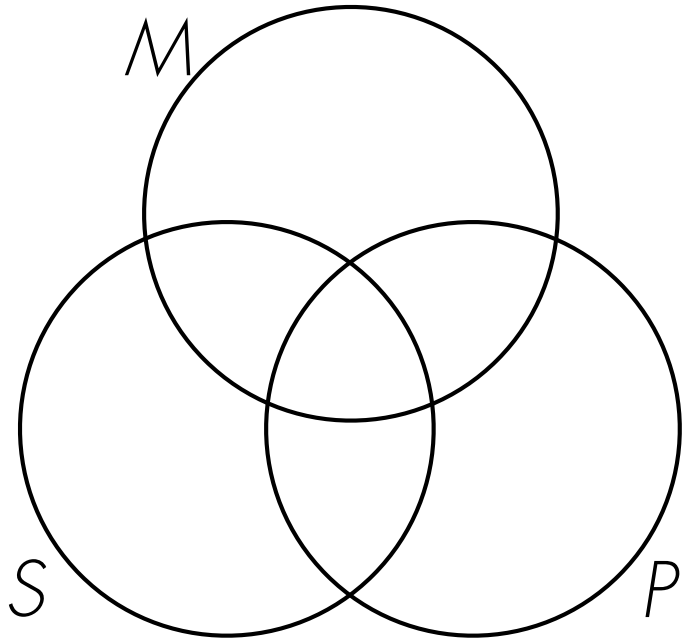
So we check the validity of a categorical syllogism by assuming that all its premises are true and then checking whether the conclusion must also be true. If the conclusion is in fact *true*, then the syllogism is valid; if the conclusion is either *false* or *undetermined*, then the syllogism is invalid.

Assessing Validity

We can use Venn diagrams to assess the validity of a categorical syllogisms. The idea is to assume that the premises are true and diagram them, and then check whether this pictures conforms to the conclusion.

Assessing Syllogisms

First, draw the three circles as follows:



Note: To keep things consistent, *always* put the major term (P) on the right, the minor term (S) on the left, and the middle term (M) on the top.

Assessing Syllogisms

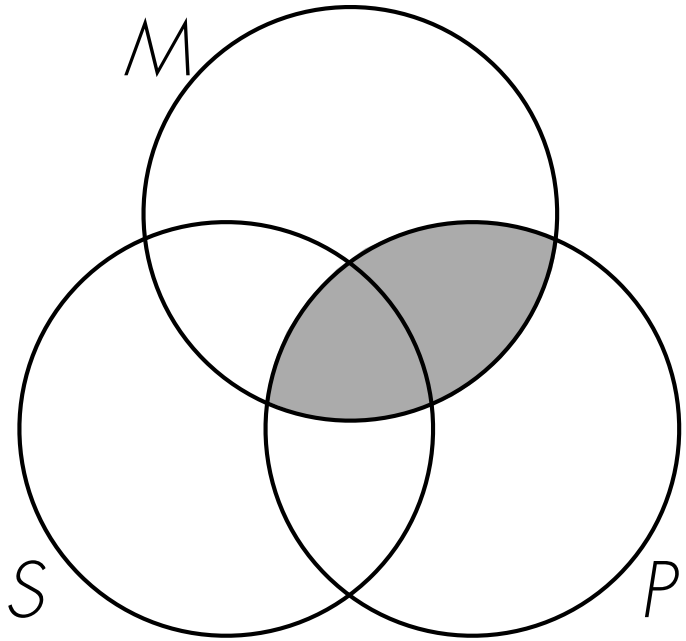
Second, put in the information expressed by the two premises into the diagram. However, there are two rules you must keep in mind for doing this:

1. Diagram any universal propositions first, and *then* diagram any particular propositions.

2. If a given particular proposition is not clear which side of a line the *x* belongs on, just draw the *x* on top of that line.

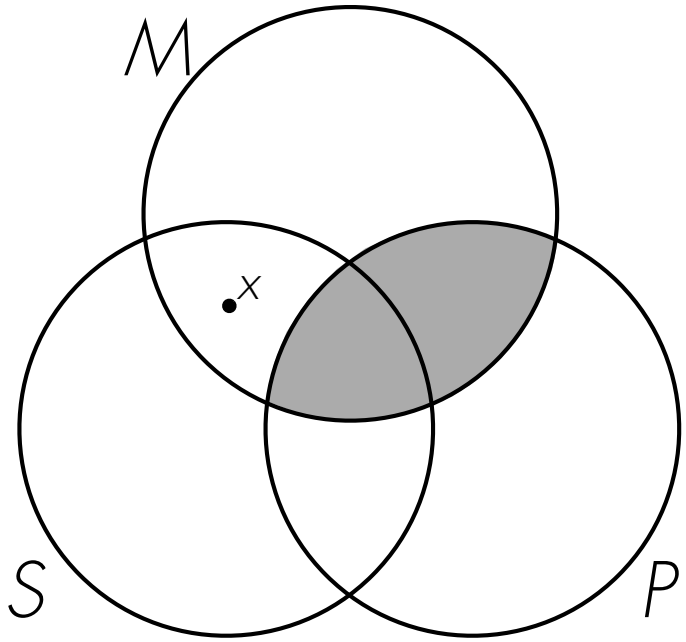
Assessing Syllogisms

In this case, there is a universal proposition ("No *P* is *M*"), so we diagram this premise first:



Assessing Syllogisms

Now we can add to this diagram the information in the particular proposition ("Some *S* is *M*"):

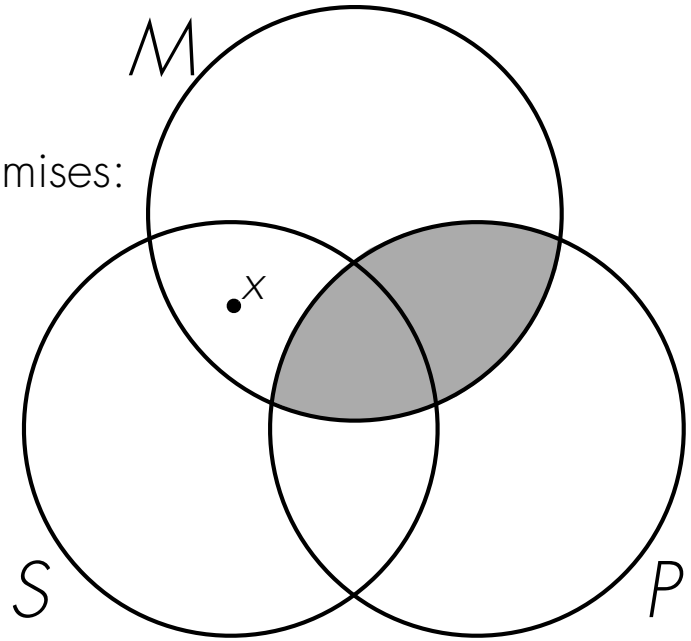


Here there is no confusion where the *x* should go.

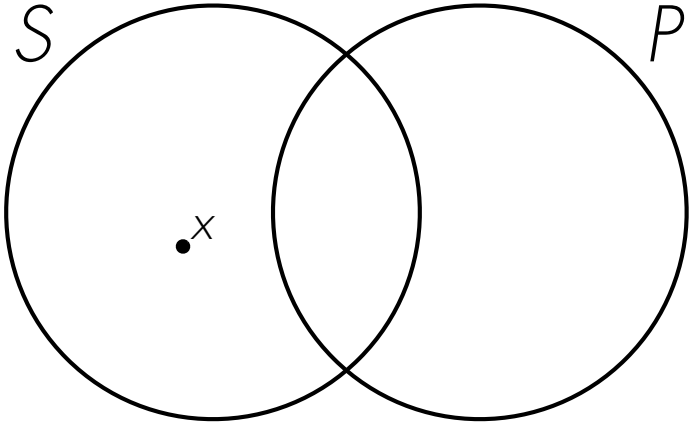
Assessing Syllogisms

Third, see if this diagram conforms to what the conclusion requires. If so, the syllogism is valid.

The premises:



The conclusion
(Some *S* is not *P*):

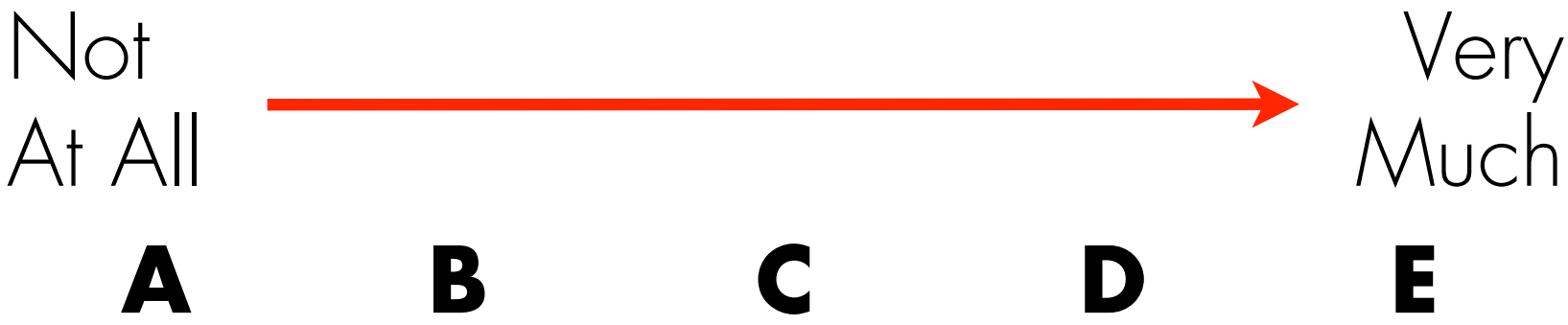


In this case, the conclusion is confirmed. It is valid.

Question 1

Indicate how you feel about solving these types of problems:

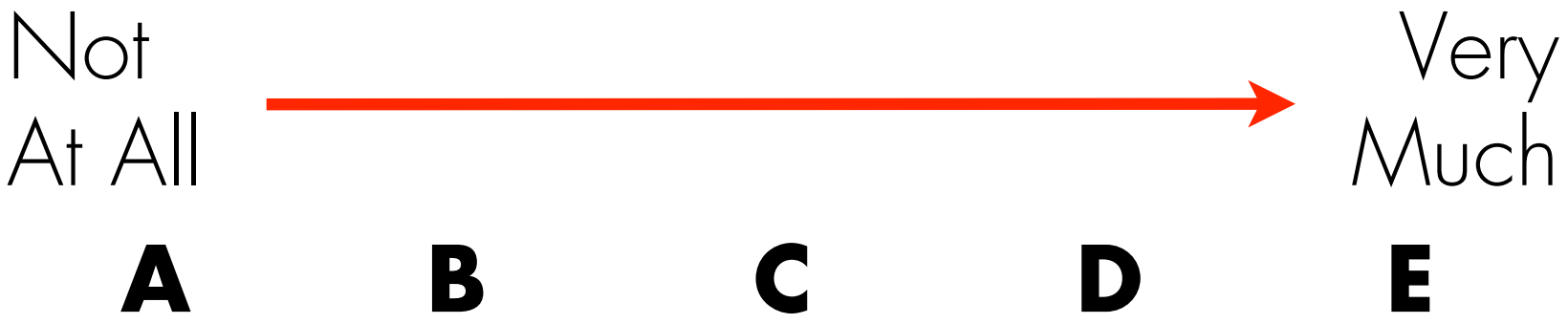
Do you understand what you are supposed to do to solve these types of problems?



Question 2

Indicate how you feel about solving these types of problems:

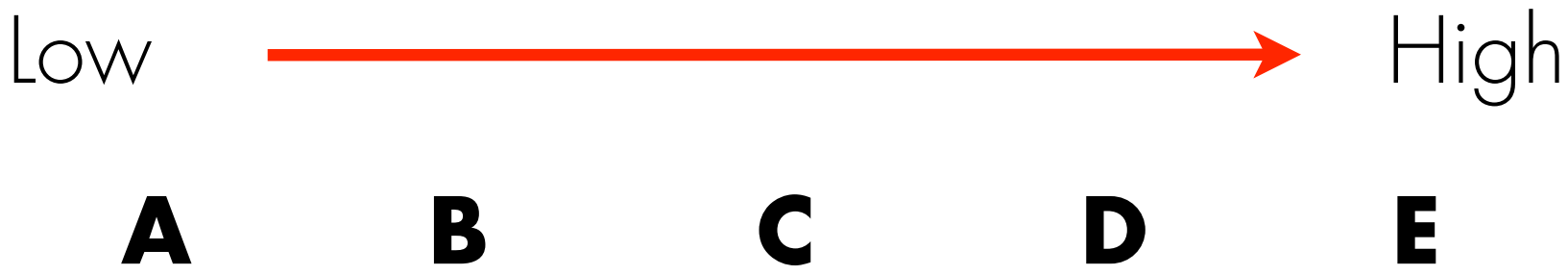
Did you receive adequate feedback on how to solve these types of problems?



Question 3

Indicate how you feel about solving these types of problems:

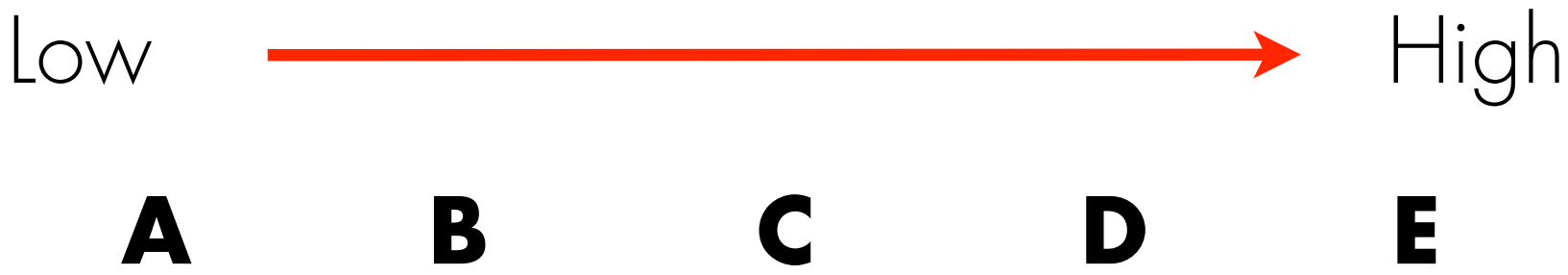
The challenges of solving these types of problems.



Question 4

Indicate how you feel about solving these types of problems:

Your skills in solving these types of problems.



Another Syllogism

This argument...

2 Some journalists are mediocre hacks, but
1 all failures are mediocre hacks. As a result,
C some journalists are not failures.

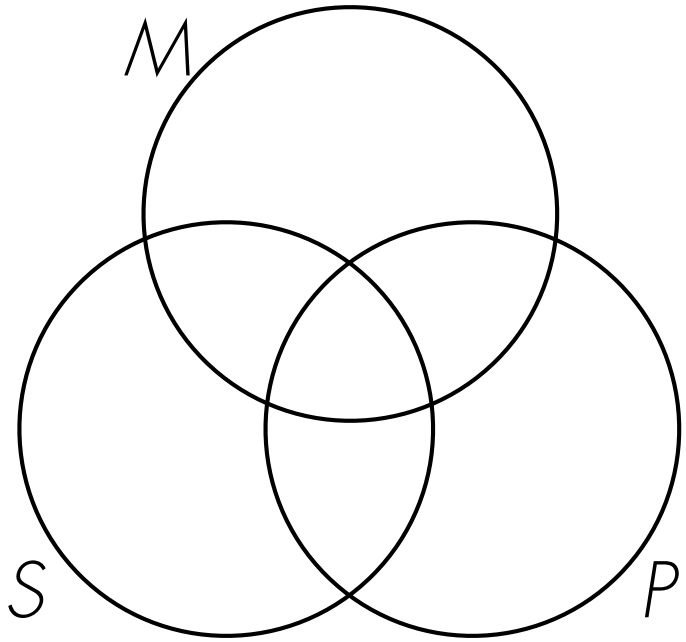
Is put into standard symbolic form...

1. All *P* is *M*.
2. Some *S* is *M*.

∴ Some *S* is not *P*.

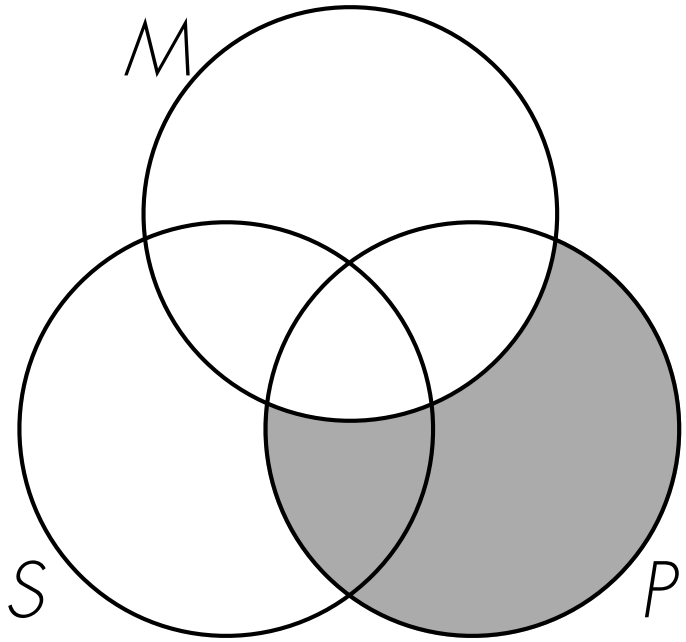
Assessing Syllogisms

First, draw the three circles:



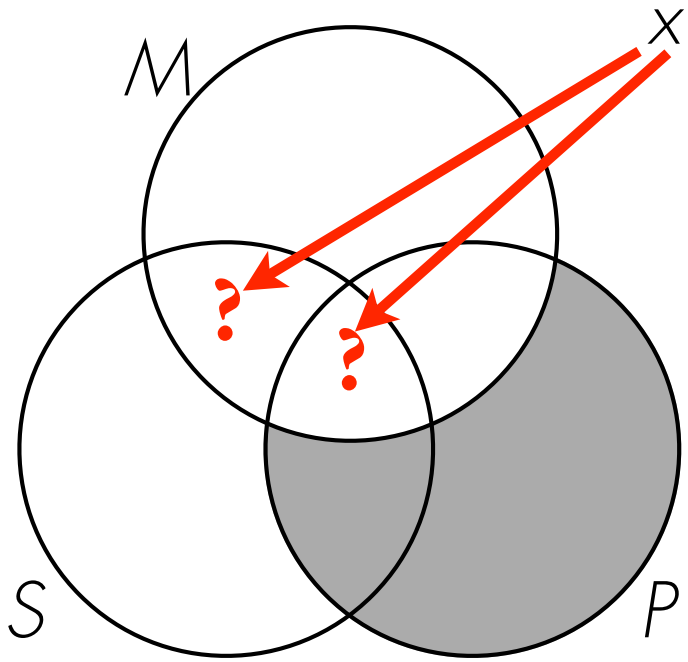
Assessing Syllogisms

Second, put in the information expressed by the two premises into the diagram. As usual, do any universal proposition first. There is one here ("All *P* is *M*"):



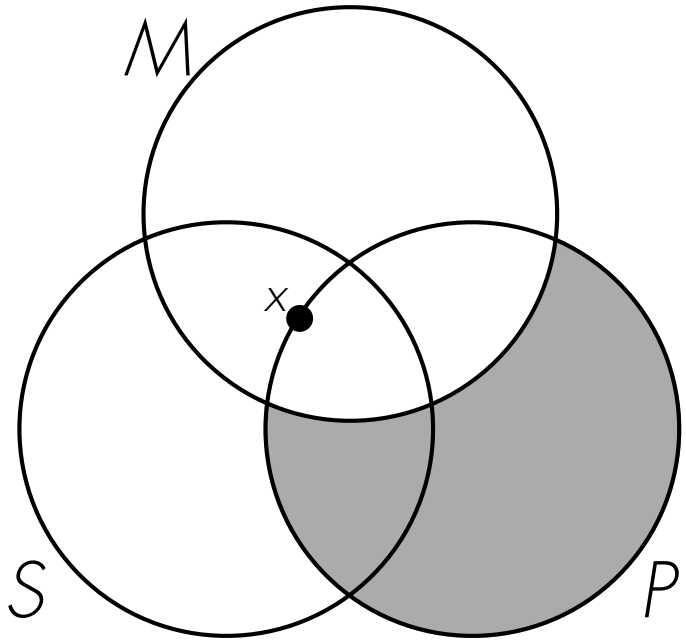
Assessing Syllogisms

Now add any particular propositions. There is one ("Some *S* is *M*"). However, notice that it is not clear where the *x* should go in this case:



Assessing Syllogisms

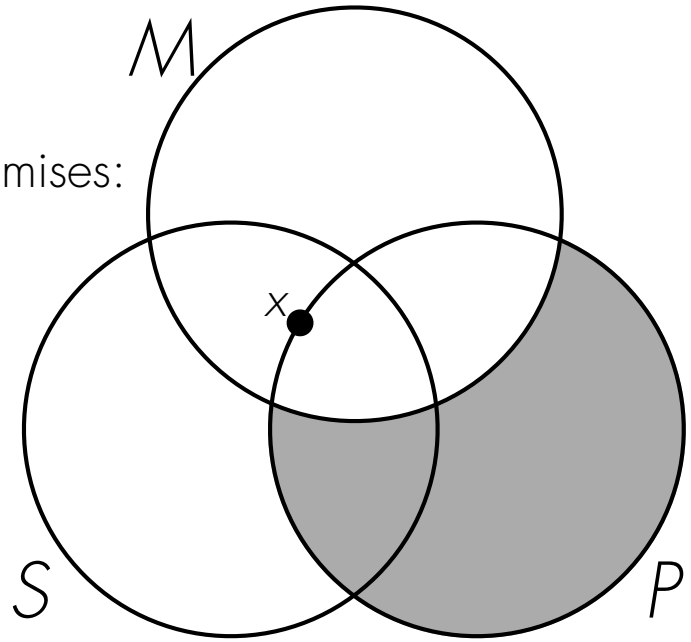
So we just put the *x* right on the line between those two regions. It could be in *either* of them. We do not have enough information to know anything further.



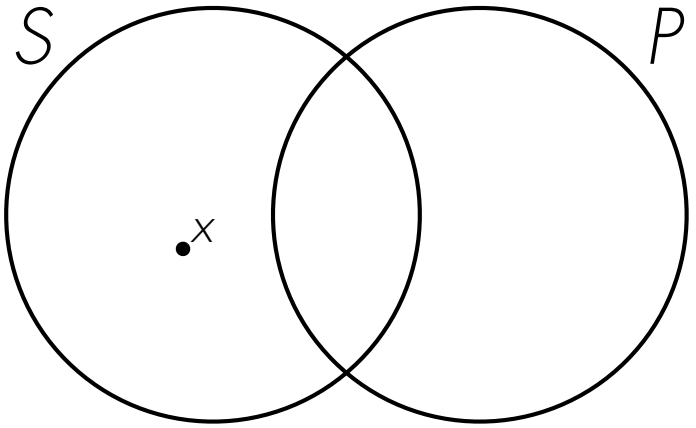
Assessing Syllogisms

Third, see if this diagram conforms to what the conclusion requires.

The premises:



The conclusion
(Some *S* is not *P*):



This does not confirm the conclusion because *x* might actually be in *P*. So this syllogism is not valid.

Next Class...

Workshop on checking categorical inferences and assessing the validity of categorical syllogisms.