Introduction to Logical Reasoning

Lecture #24

Assessing Categorical Syllogisms

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Four Standard Forms of Categorical Statements

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*.

Categorical Syllogisms

Last time we looked at categorical syllogisms, which are arguments involving three categorical statements. In particular, we saw how to put arguments of either sort into standard symbolic form, and how that form can be used to determine its validity.

Argument 1

This categorical syllogism:

> Some famous writers are mediocre hacks, but no insightful journalists are mediocre hacks. As a result, some famous writers are not insightful journalists.

Is put into standard symbolic form:

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

∴ Some *S* is not *P*.

But can we check its validity without appealing to a memorized table?

Assessing Validity

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

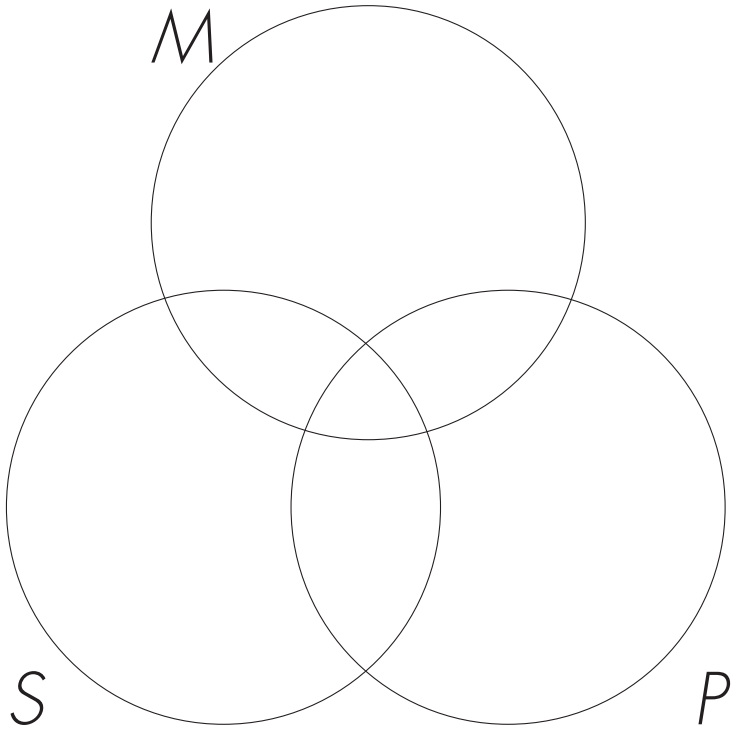
So we check the validity of a categorical syllogism by assuming that all its premises are true and then checking whether the conclusion must also be true. If the conclusion must be *true*, then the syllogism is valid; if the conclusion is either *false* or *unknown*, then the syllogism is invalid.

Assessing Validity

The easiest way to check validity without resort to memorization is by using Venn diagrams. The idea is to first assume that the premises are true and diagram them. After that, diagram the conclusion. Finally, see if this diagram of the conclusion conforms what appears in the diagram of the premises.

Assessing Syllogisms

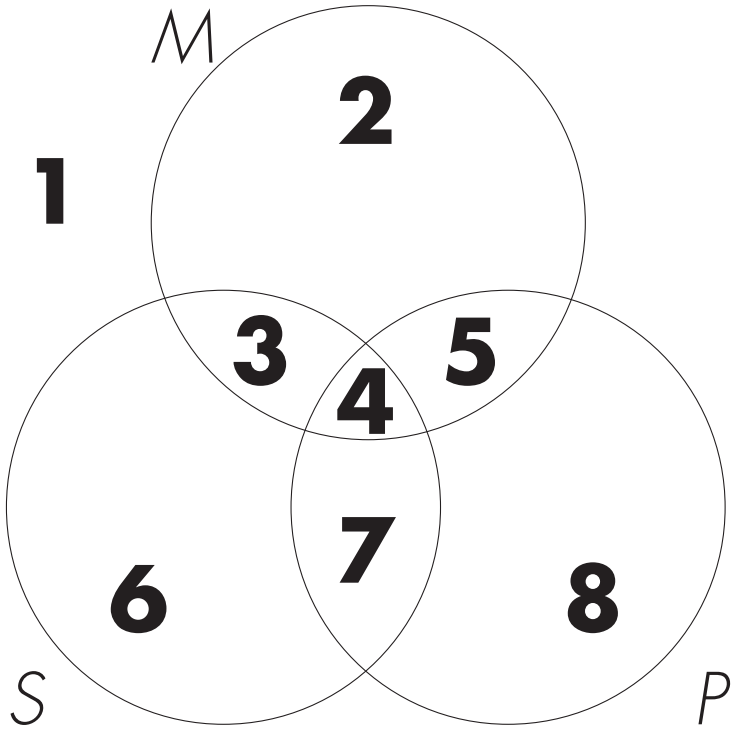
First, draw the three circles as follows:



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*) up top.

Assessing Syllogisms

Notice that there are now a lot more subcategories ("zones"):



Assessing Syllogisms

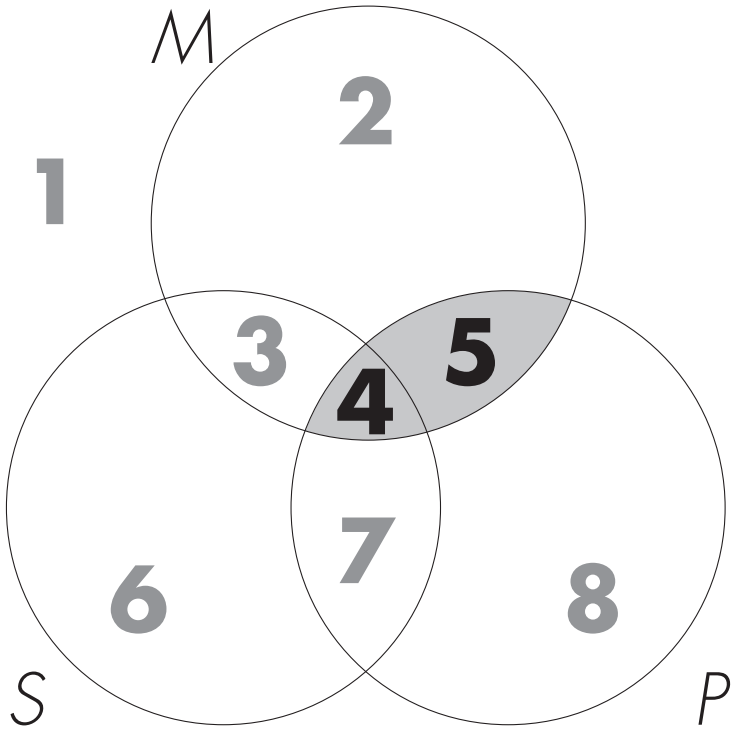
Second, put in the information expressed by the two premises into the diagram. However, there are two rules you must remember:

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

2. If a particular statement is not clear on which side of a line a dot-*x* belongs, you *must* then draw the dot-*x* on top of that line.

Assessing Syllogisms

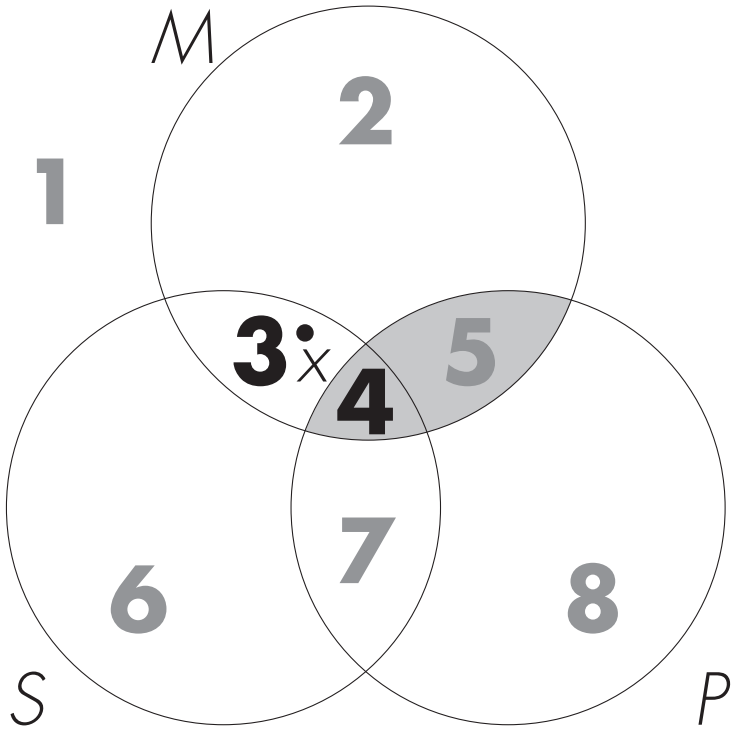
In argument 1, premise 1 is a universal statement (**E**: No *P* is *M*), so diagram that premise first:



Remember: The rule for **E** statements says to shade the area that the two categories have in common. In this case, the common area for *P* and *M* are zones 4 and 5.

Assessing Syllogisms

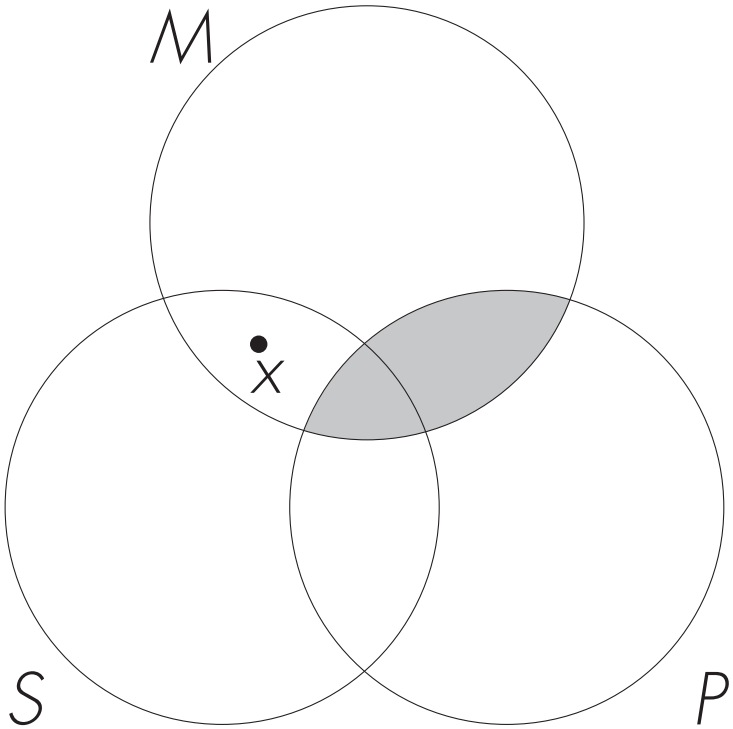
Now we can add to this diagram the information from premise 2, which is a particular statement (**I**: Some *S* is *M*):



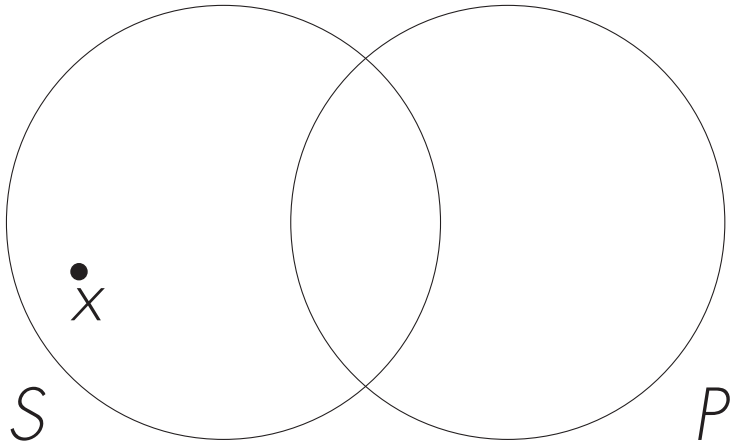
Remember: The rule for **I** statements says a dot-*x* goes in the area that the two categories have in common. For *S* and *M*, those are zones 3 and 4. However, the dot-*x* simply *cannot* be in zone 4. Why? Because zone 4 is shaded in, it is empty. So the dot-*x* *must* be put in zone 3.

Assessing Syllogisms

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



The Premises



The Conclusion (**O**: Some *S* is not *P*.)

In this case, the conclusion requires a dot-*x* in *S* outside of *P*. Looking at the premises' diagram, there is indeed a dot-*x* in *S* outside of *P*. So this syllogism is *valid*.

Argument 2

This categorical syllogism:

> Some popular journalists are mediocre hacks (2), but all pathetic failures are mediocre hacks (1). Thus (CI), some popular journalists are not pathetic failures (C).

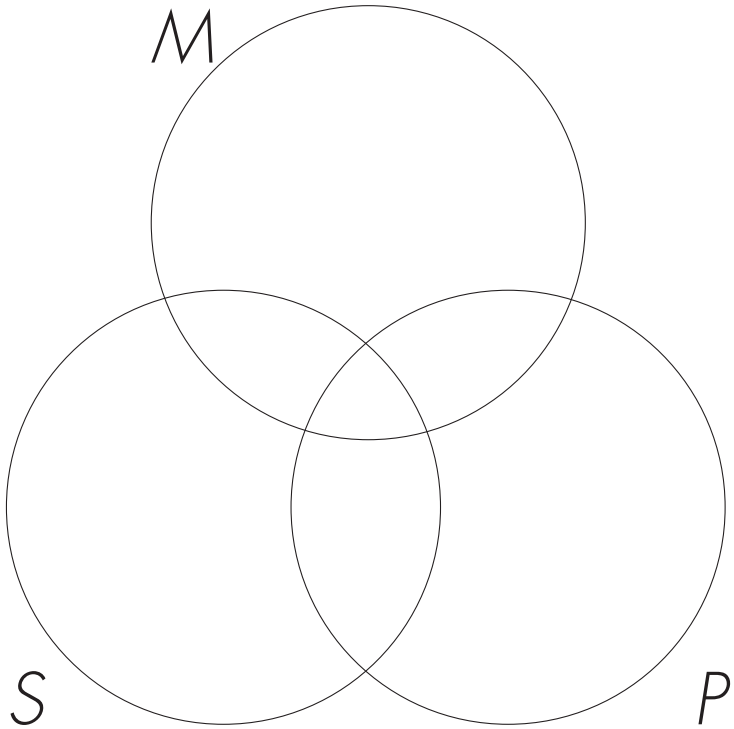
Is put into standard symbolic form:

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

∴ Some *S* is not *P*.

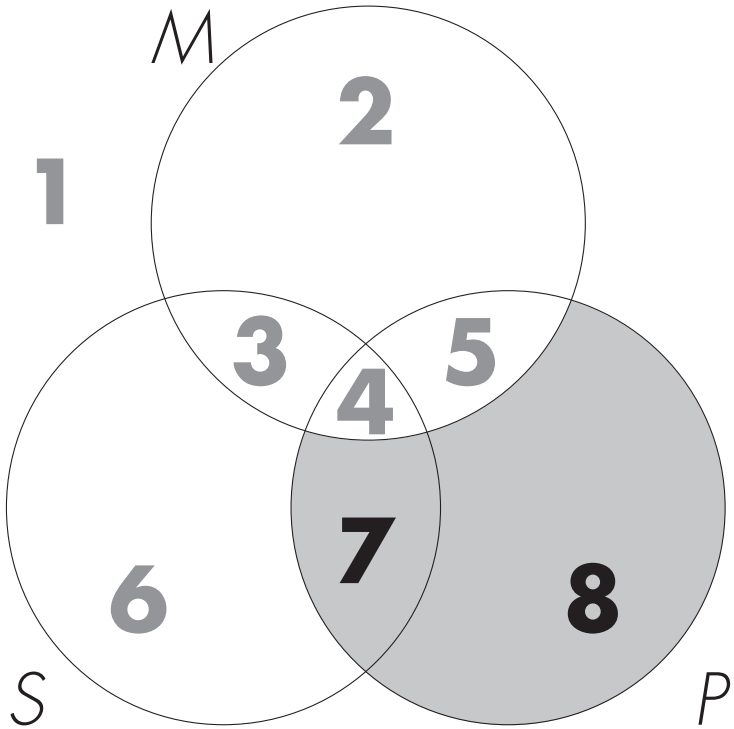
Assessing Argument 2

Draw the three circles:



Assessing Argument 2

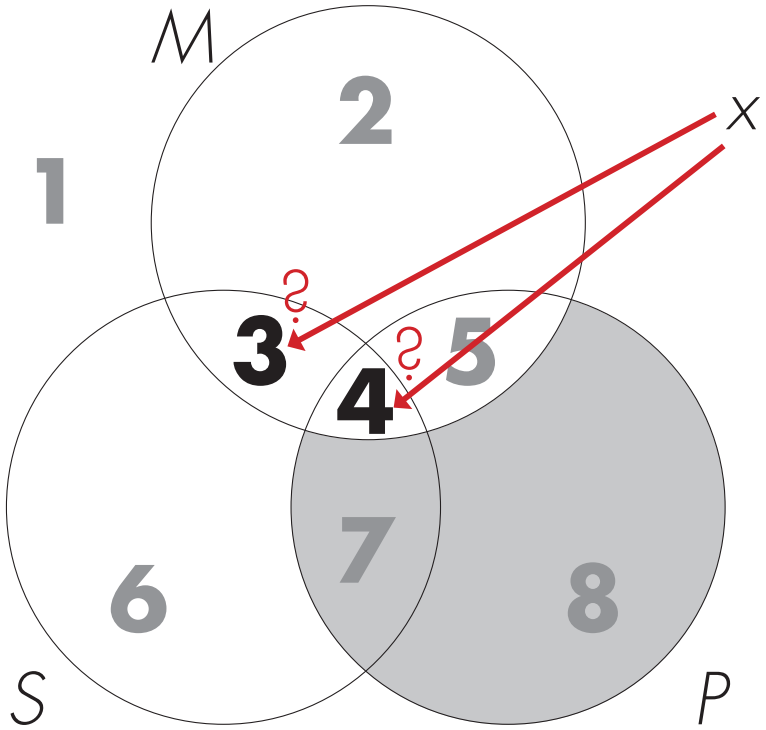
Diagram the information given by the two premises. As usual, do any universal statement first. This means premise 1 (**A**: All *P* is *M*) is first:



Remember: The rule for **A** statements says to shade the area of *X* that is not shared with *Y*. In this case, *X* = *P* and *Y* = *M*. So for *P* and *M*, those are zones 7 and 8.

Assessing Argument 2

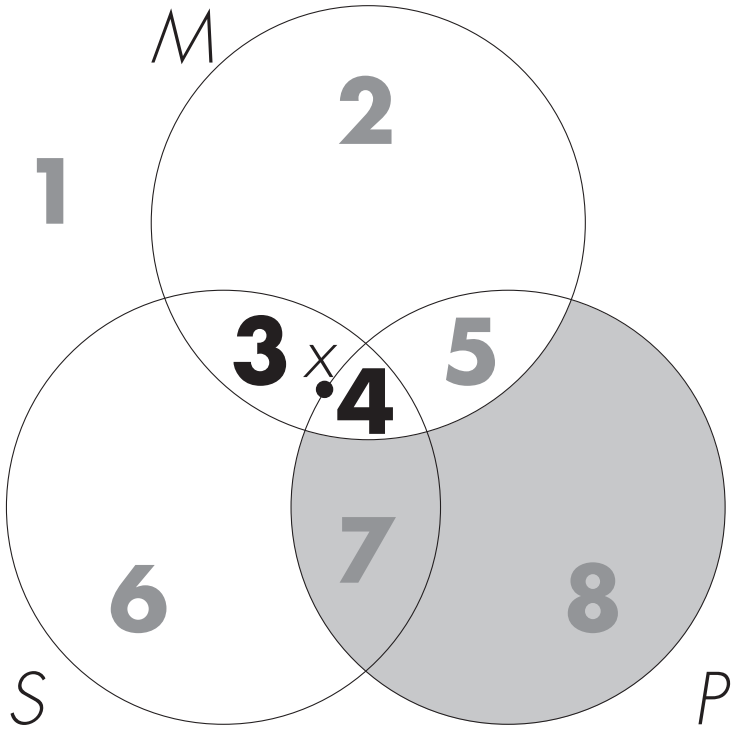
Now add any particular statements, like premise 2 (**I**: Some *S* is *M*):



Remember: The rule for **I** statements says a dot-*x* goes in the area that the two categories have in common. For *S* and *M*, those are zones 3 and 4. However, we do not know in which zone the dot-*x* is put. It could logically be in *either* of them.

Assessing Argument 2

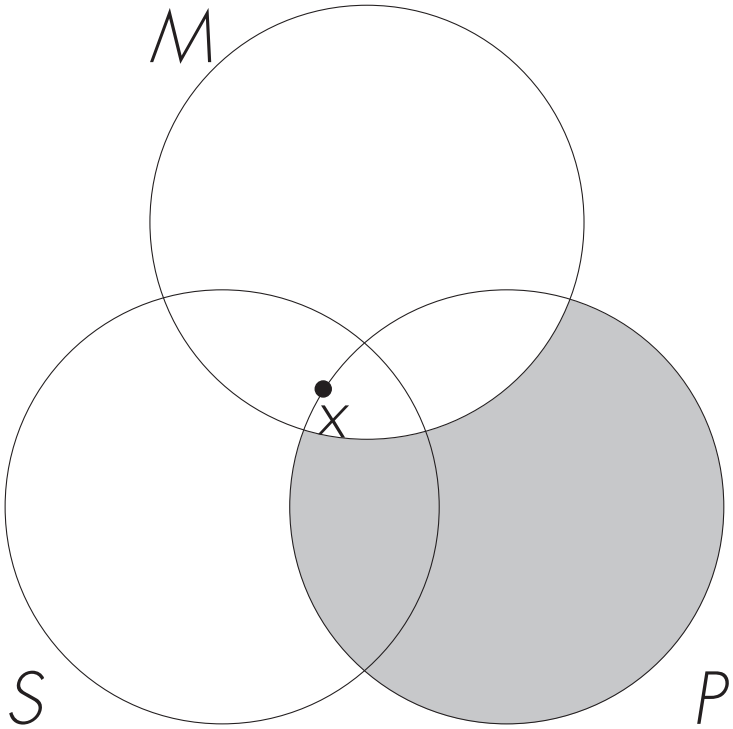
Now add any particular statements, like premise 2 (**I**: Some *S* is *M*):



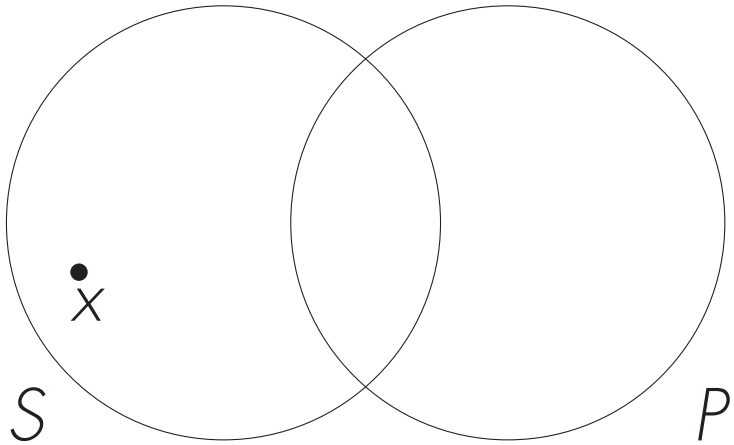
Remember: The rule for **I** statements says a dot-*x* goes in the area that the two categories have in common. For *S* and *M*, those are zones 3 and 4. However, we do not know in which zone the dot-*x* is put. It could logically be in *either* of them. So the dot-*x must* go on the line separating zones 3 and 4.

Assessing Argument 2

Finally, see if the diagram of the premises conforms to what the conclusion requires.



The Premises



The Conclusion (**O**: Some *S* is not *P*.)

In this case, the conclusion requires a dot-*x* in *S* outside of *P*. Looking at the premises' diagram, we do not know for sure whether that dot-*x* in *S* is outside of *P* or not. So, this syllogism is *invalid*.

Argument 3

This categorical syllogism:

> Some clever people are journalists, and all clever people are hard workers. As a result, some journalists are hard workers.

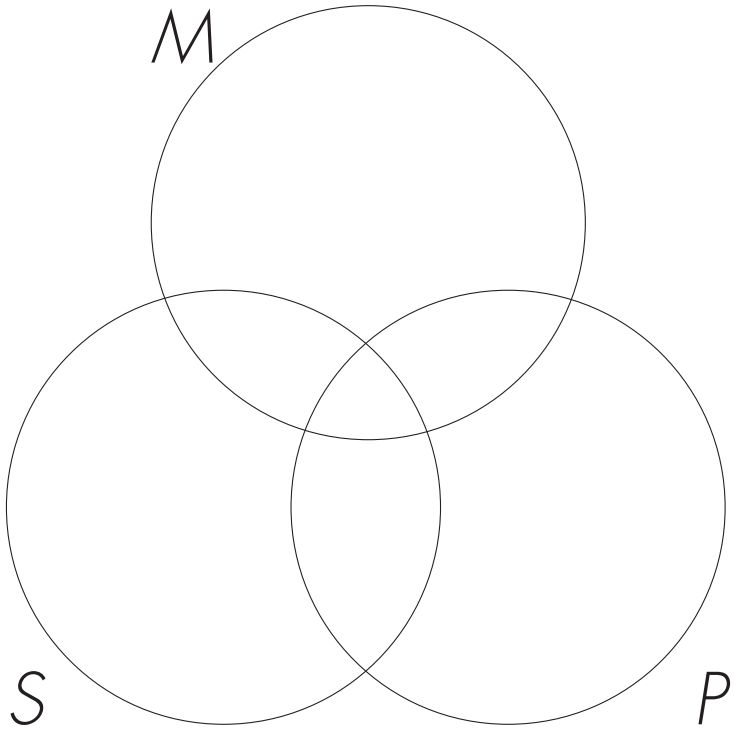
Is put into standard symbolic form:

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

∴ Some *S* is *P*.

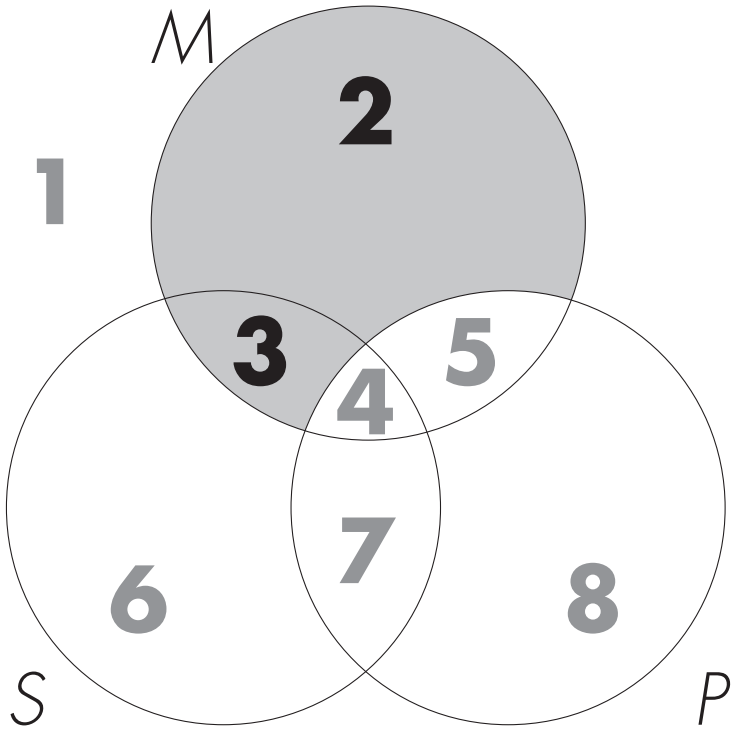
Assessing Argument 3

Draw the three circles:



Assessing Argument 3

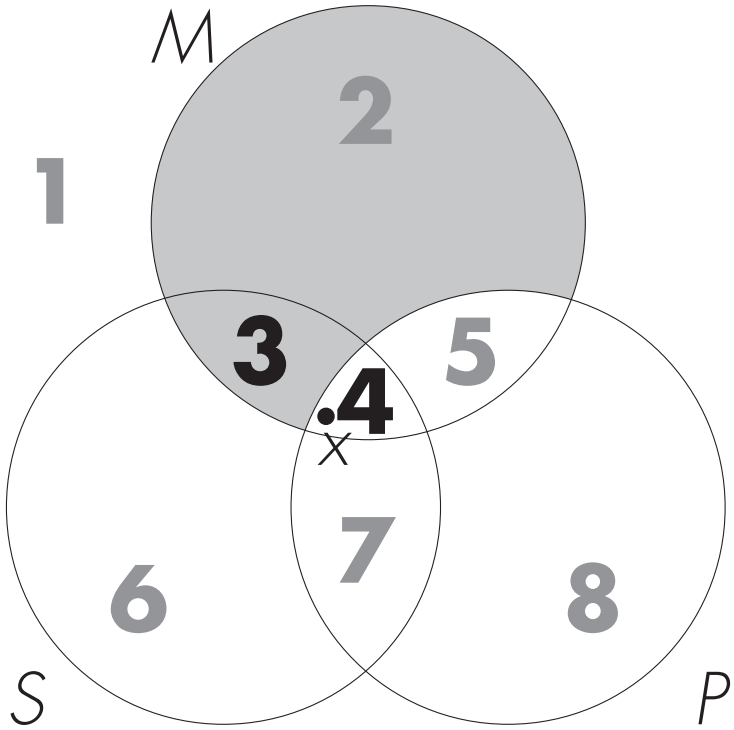
Diagram the information given by the two premises. As usual, do any universal statement first. This means premise 1 (**A**: All *M* is *P*) is first:



Remember: The rule for **A** statements says to shade the area of *X* that is not shared with *Y*. In this case, *X* = *M* and *Y* = *P*. So for *M* and *P*, those are zones 2 and 3.

Assessing Argument 3

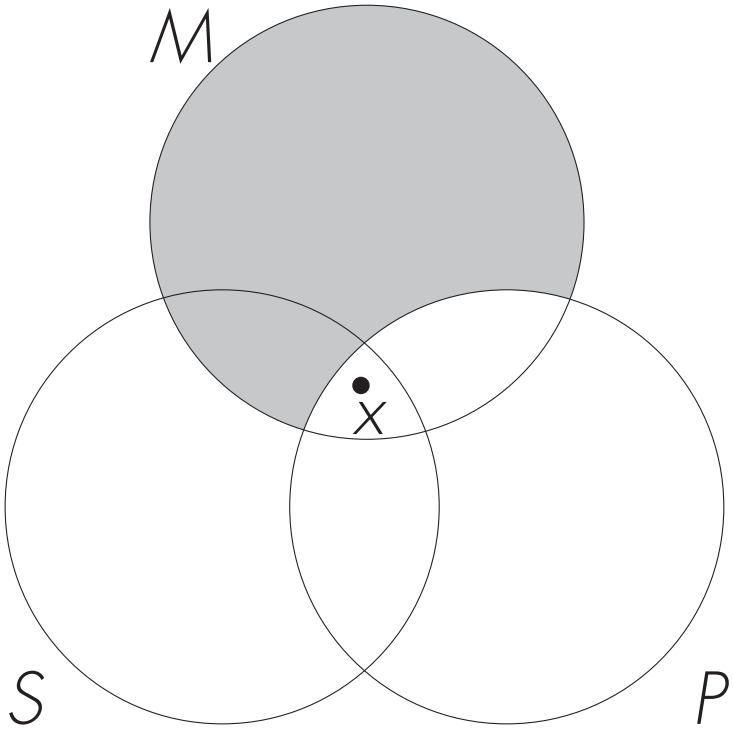
Now add any particular statements, like premise 2 (**I**: Some *M* is *S*):



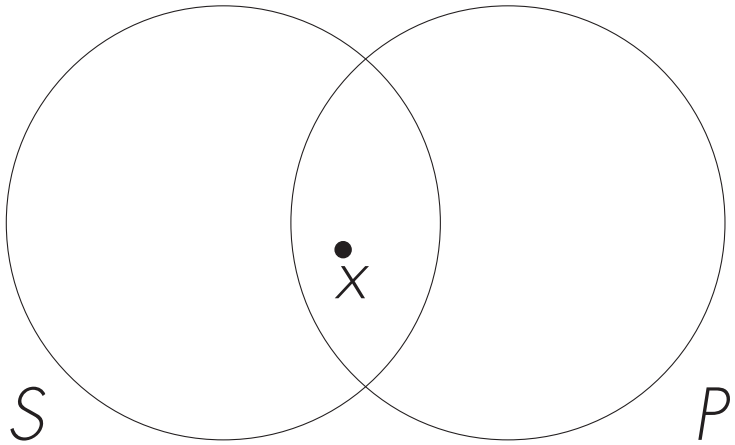
Remember: The rule for **I** statements says a dot-*x* goes in the area that the two categories have in common. For *M* and *S*, those are zones 3 and 4. However, the dot-*x* simply *cannot* be in zone 3. Why? Because zone 3 is shaded in, it is empty. So the dot-*x* *must* be put in zone 4.

Assessing Argument 3

Finally, see if the diagram of the premises conforms to what the conclusion requires.



The Premises



The Conclusion (**I**: Some *S* is *P*.)

In this case, the conclusion requires a dot-*x* in the area of overlap between *S* and *P*. Looking at the premises' diagram, there is indeed a dot-*x* in the area of overlap between *S* and *P*. So this syllogism is *valid*.

Next Class...

We will have a workshop assessing the validity of categorical syllogisms by using Venn diagrams.

Also, please do not forget to turn in your response to the Lecture #24 Questionnaire on your way out.