OUTLINES TO ACCOMPANY THE AUDIO SERIES

INTRODUCTORY LOGIC

Ligonier Ministries

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Tape #1: "Informal Fallacies"
by R.C. Sproul

I. *Organon* (Greek for instrument) logic is the instrument (organon) by which all science operates.

II. Reason is primary in the order of knowing, not being. Reason is how we apprehend that which is known.

III. We do not have a God who speaks in contradictions. Logic is essential in interpreting the Scriptures.

IV. A fallacy is a type of incorrect argument. Informal fallacies in logic are fallacies caused by carelessness and inattentiveness. They are not technical in nature.

V. The fallacy of the irrelevant conclusion — an argument that does not establish what it intends to establish.

A. *Argumentum ad baculum* — persuasion by force — "might makes right" — argument by intimidation.

B. *Ad hominem* — reasoning to the man.

1. *Argumentum ad hominem abusive* — destroy the argument by attacking the man.

2. *Argumentum ad hominem circumstantial* — an argument which appeals to the circumstances surrounding an opponent.

3. *Argumentum ad ignorantian* — argument from ignorance. It is true because it has never been proved false.

4. *Argumentum ad misercordiam* — an argument which appeals to pity.

Tape #2: "Informal Fallacies" Continued
by R.C. Sproul

I. More fallacies of the irrelevant conclusion.

A. *Argumentum ad populum* — argument to the people — appeal to the multitude.

B. *Argumentum ad vericundiam* — appeal to authority.

1. The *ad populum* argument can be thought of as an *ad vericundiam* argument where the authority is the majority.

2. An appeal to a specific authority.

3. A common error is to attribute authority to those who have established authority in another field. An appeal to authority is valuable when the person has established authority in the given field.

C. Conclusions reached by the error of false causes.

1. *Non causa pro causa* — the error of mistakenly attributing causal power to something which is not the cause.

2. *Post hoc ergo propter hoc* — means "after this, therefore because of this." If something takes place in time before something else takes place, it must be the cause of what comes after it.

Tape #3: "Major Ideas"
by R.C. Sproul

I. The law of noncontradiction

A. *A* cannot be *A* and *non-A* at the same time and in the same sense.

B. A statement and its negation cannot be true simultaneously.

II. Contradiction vs. paradox

A. The classic definition of a paradox is something which appears contradictory. A paradox looks like a contradiction, but it is not a contradiction.

B. A paradox is not a contradiction although unfortunately the words are sometimes used synonymously.

III. The standard syllogism

A. A syllogism is a form of thought in which a conclusion is inferred from two premises.

B. In a syllogism we find a major term, a minor term, and a middle term.

Example: All men are mortal (major premise).
Socrates is a man (minor premise).
Therefore, Socrates is mortal (conclusion).

1. The major term is the predicate of the conclusion — (mortality).

2. The minor term is the subject of the conclusion — (Socrates).

3. The middle term is found in both premises but not in the conclusion — (man).

IV. Categorical propositions

A. The universal affirmative — All S is P.

B. The universal negative — No S is P.

C. The particular affirmative — Some S is P.

D. The particular negative — Some S is not P.

E. Abbreviations for the categorical propositions — A, E, I, and O.

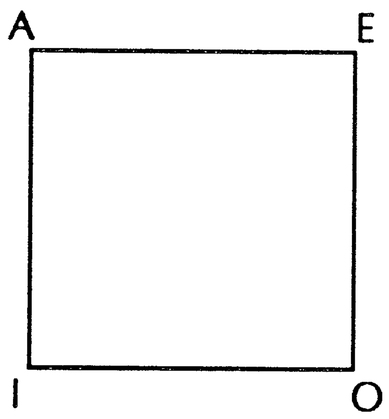
1. A: universal affirmative

2. E: universal negative

3. I: particular affirmative

4. O: particular negative

V. The square of opposition



Relationships:

Horizontal: A to E (contraries)
I to O (sub-contraries)
Vertical: I to A and O to E (subalternations)
Diagonal: A to O and E to I (contradictions)

Tape #4: "Formal Propositions and Venn Diagrams"
by R.C. Sproul

I. The Either/Or Fallacy (Black/White Fallacy)

A. Options are limited to two when there are actually three or more options.

B. The fallacy of the impossible *tertium quid* (third alternative).

1. In a situation which is actually either/or people try to resolve the situation by introducing a third alternative.

2. This fallacy frequently occurs in situations when prefixes such as *non*, *im*, *in*, and *dis* are used. For example, something is either possible or impossible. There is no third alternative.

II. Symbolism

A. Letters such as S, P, and M are used to represent subject, prediciate, and middle, respectively.

B. To say that there are no members of a class S we write $S = O$. To say that there are members of a class S we write $S \neq O$.

C. The class of things which belong to both classes S and P is represented by SP.

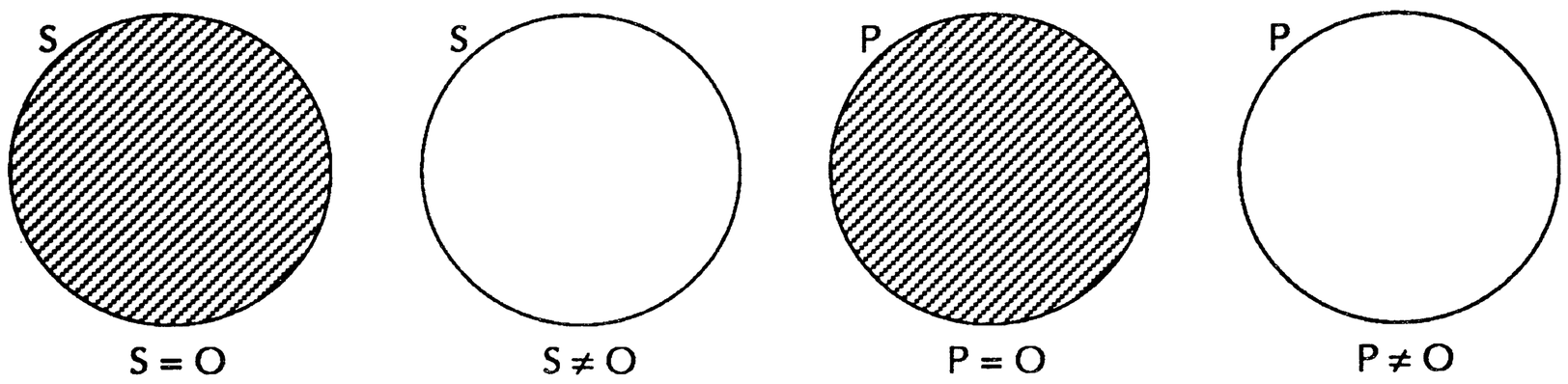
D. The class of all things which is non-S is represented by $\overline{S}$.

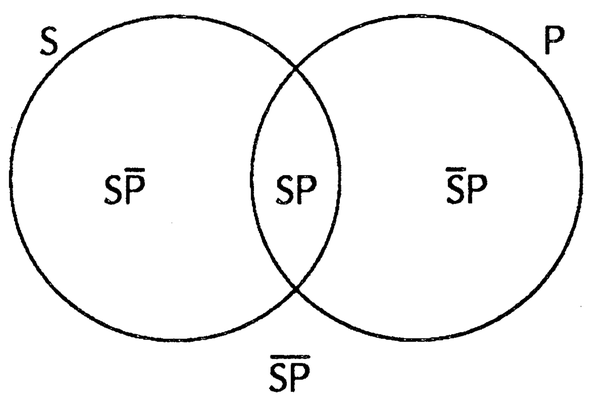
E. To state an E proposition (No S is P) we can write $SP = O$. Likewise, an I proposition (Some S is P) can be written $SP \neq O$, an A proposition (All S is P) can be written $S\overline{P} = O$ and an O proposition (Some S is not P) can be written $S\overline{P} \neq O$.

III. Venn Diagrams

A. A Venn diagram uses circles to depict classes, relationships, and propositions.

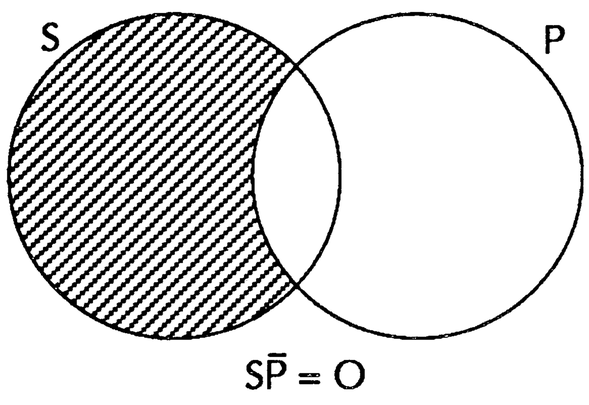
B. Examples of the use of Venn diagrams.



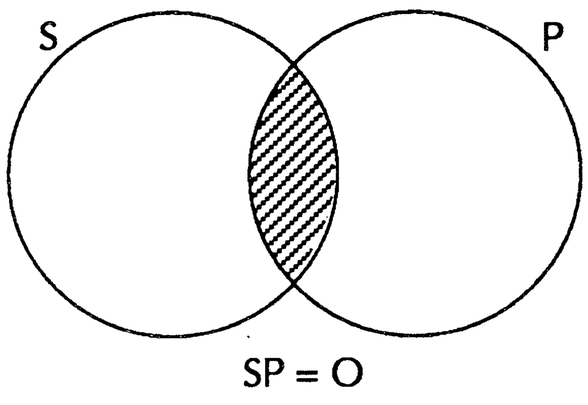


C. Using Venn diagrams to depict categorical propositions.

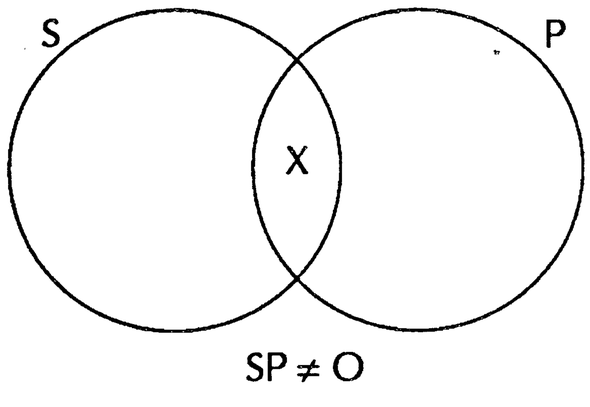
A: All S is P



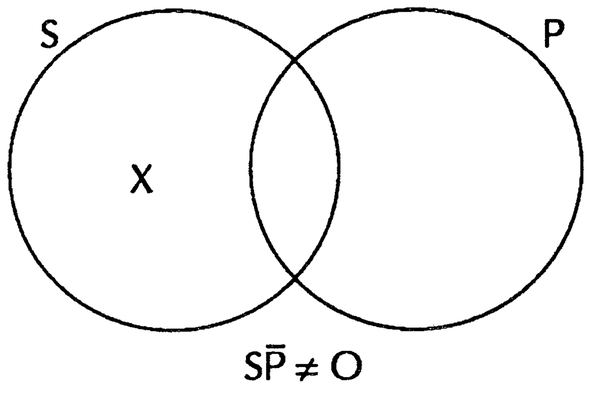
E: No S is P



I: Some S is P



O: Some S is not P

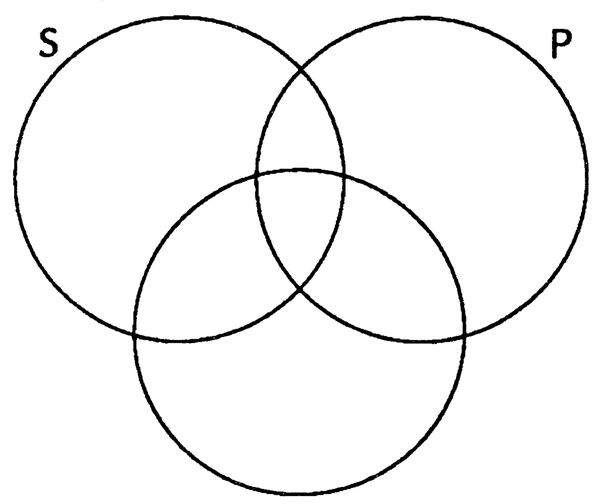


Tape #5: "Using Venn Diagrams to Test Validity"

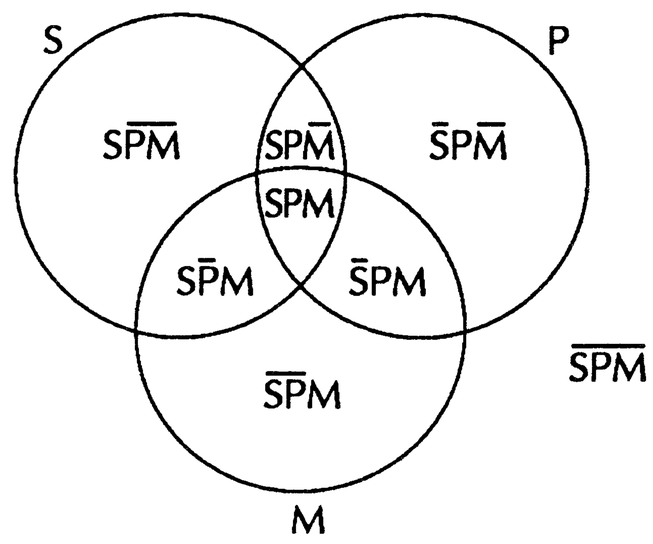
by R.C. Sproul

I. Diagramming syllogisms

A. Three overlapping circles are used representing the minor term, the major term, and the middle term represented by S (subject), P (predicate), and M (middle) respectively.



B. The regions represented by the overlapping circles diagram eight formal classes (seven regions plus the outside). These regions diagram the classes $S\overline{P}\overline{M}$, $SP\overline{M}$, $\bar{S}P\overline{M}$, SPM, $S\bar{P}M$, $\bar{S}PM$, $\bar{S}\bar{P}M$, and $\overline{SPM}$.



C. To test for validity we diagram the two premises and then determine if we have already diagrammed the conclusion. That is, if no additional shading is needed the argument is valid. If additional shading is needed then the argument is invalid.

Example #1: A valid argument.

All M is P.
<u>All S is M</u>.
Therefore, All S is P.

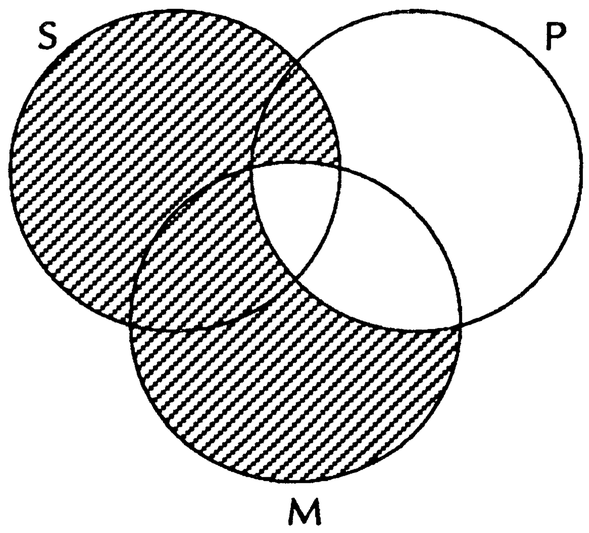
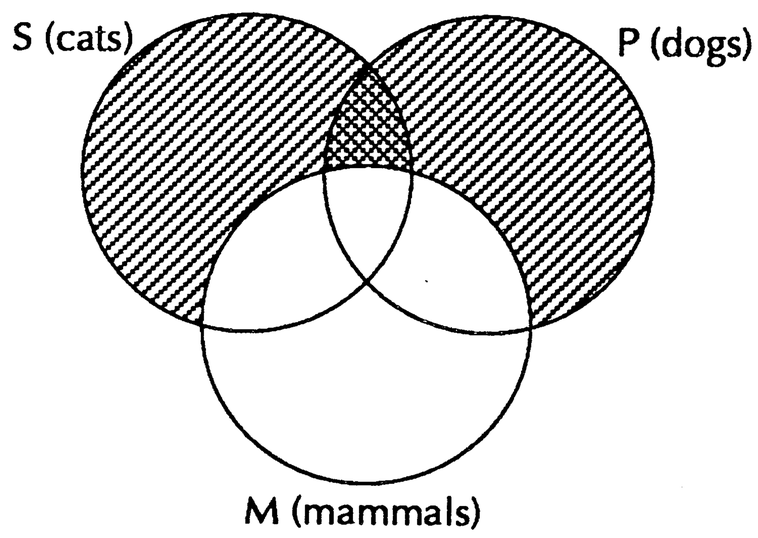


Diagram the two premises by shading the circles.

To test for validity we observe that the conclusion has also been diagrammed, that is, no additional shading is needed.

Here we see that All S is P.

Example #2: An invalid argument:



All dogs are mammals.
<u>All cats are mammals</u>.
Therefore all cats are dogs.

To determine the subject, predicate, and middle term, we look at the conclusion. Here, S is cats, P is dogs, and M is mammals.

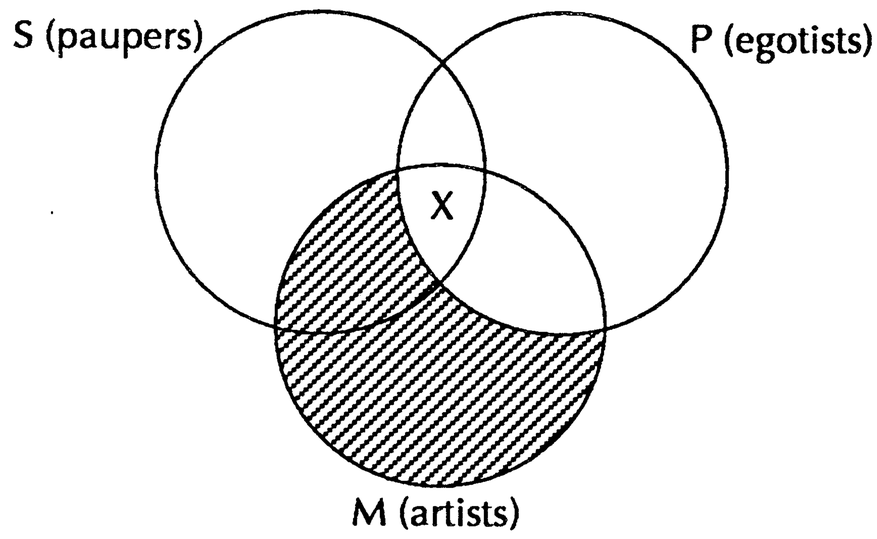
Translating, we have:

All S is M.
<u>All P is M</u>.
Therefore, All S is P.

We can see that this is not valid because additional shading is needed to diagram the conclusion.

II. Testing validity with universal and particular premises

A. Example #1:



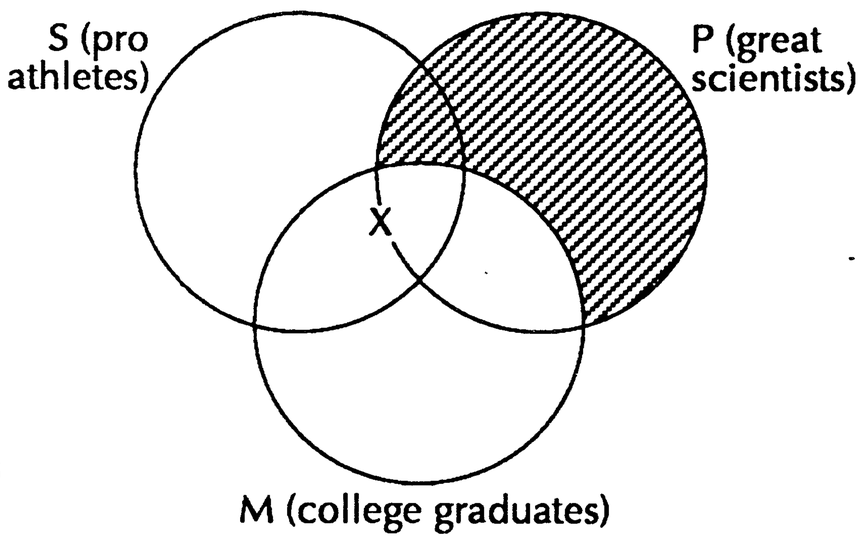
All artists are egotists.
<u>Some artists are paupers</u>.
Therefore, some paupers are egotists.

Translating, we have S is paupers, P is egotists, and M is artists.

All M is P.
<u>Some M is S</u>.
Therefore, Some S is P.

B. Note that a Venn diagram tests only the validity of the relationship between the premises and the conclusion. It does not test the formal truth of the premises.

C. Example #2:



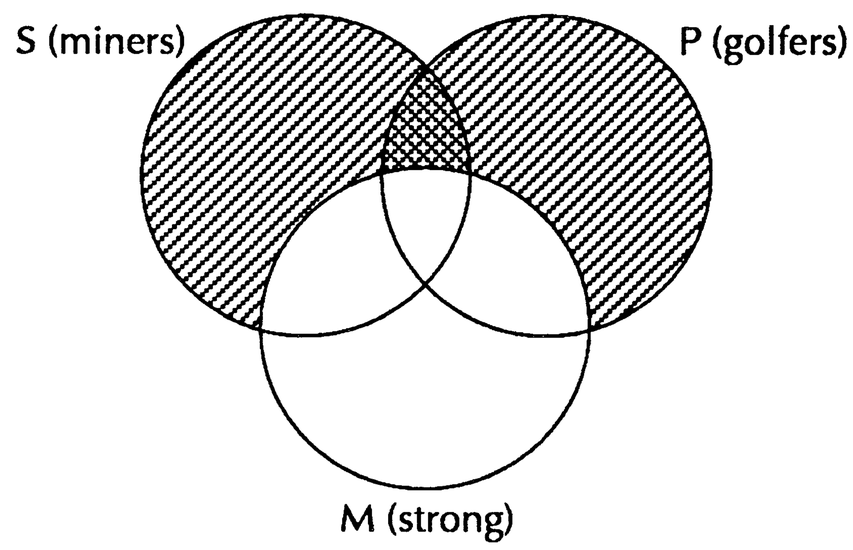
All great scientists are college graduates.
Some professional athletes are college graduates.
Therefore, some professional athletes are great scientists.

Translating, we have S is professional athletes, P is great scientists and M is college graduates.

All P is M.
Some S is M.
Therefore, Some S is P.

The X placed on the line shows that it could be placed in either S$\bar{P}$M or SPM. Since it is not possible to determine from the premises in which region the X should be placed we conclude that the argument is invalid.

D. Example #3:



All miners are strong.
All golfers are strong.
All miners are golfers.

Translating, we have S is miners, P is golfers, and M is strong.

All S is M.
All P is M.
Therefore, All S is P.

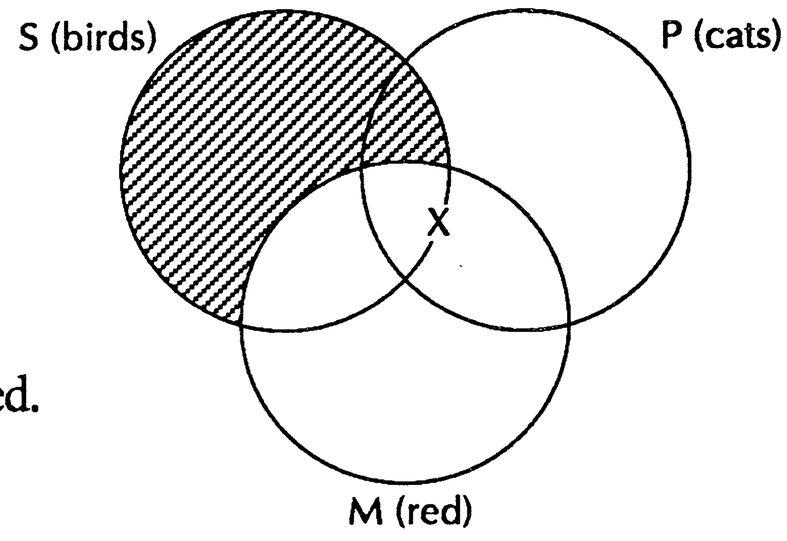
The argument is invalid.

E. Example #4:

Some men are black.
Some men are not black.
Therefore, some women are black.

This argument cannot be diagrammed because a fourth term has been introduced.

F. Example #5:



All birds are red.
<u>Some cats are red</u>.
Therefore, some birds are cats.

Translating, we have S is birds, P is cats, and M is red.

All S is M.
<u>Some P is M</u>.
Therefore, some S is P.

The argument is invalid.

Tape #6: "More on Testing Syllogisms"
by R.C. Sproul

I. Rules for testing syllogisms without Venn diagrams.

A. A valid syllogism must contain exactly three terms all of which are used in the same sense throughout the argument.

1. The fallacy of four terms (actually four or more).

2. The fallacy of equivocation or ambiguity (meaning change).

B. The middle term must be distributed in at least one premise.

1. A term is distributed in a premise when the premise refers to all the members of the class designated by the term.

2. The fallacy of the undistributed middle term.

C. No term can be distributed in the conclusion which is not distributed in the premises.

D. No valid syllogism contains two negative premises.

E. If either premise is negative then the conclusion must be negative.

F. No valid syllogism with a particular conclusion can have two universal premises.

II. Arguments in normal rational discourse may be translated into formal language to test validity.