PHI 103 - Categorical Logic
Lecture 3

Categorical Logic
Categorical Syllogisms

Categorical Logic

Syllogisms

Definitions:

Syllogism - a deductive argument composed of exactly two premises and one conclusion.

Categorical Syllogism - a syllogism composed of *categorical propositions* with exactly three distinct terms.

I. **The Parts** of a Categorical Syllogism -

A. The **Major Term** - the ***predicate*** term of the conclusion

B. The **Minor Term** - the ***subject*** term of the conclusion

P1) - All mammals are **animals with hearts**.

P2 - All **dogs** are mammals.

C) - All **dogs** are **animals with hearts**.

minor term ***major term***

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I. **The Parts** of a Categorical Syllogism -

A. The **Major Term** - the ***P*redicate** of the conclusion

B. The **Minor Term** - the ***S*ubject** of the conclusion

C. The **Middle Term** - the term **repeated** in the premises, but ***not*** in the conclusion.

P1) - All ***mammals*** are **animals with hearts**.

P2) - All **dogs** are ***mammals***.

C) - All **dogs** are **animals with hearts**.

middle term

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I. **The Parts** of a Categorical Syllogism -

A. The **Major Term** - the ***P***redicate of the conclusion

B. The **Minor Term** - the ***S***ubject of the conclusion

C. The **Middle Term** - the term **repeated** in the premises, but ***not*** in the conclusion.

D. The **Major *Premise*** - the premise that contains the major term

E. The **Minor *Premise*** - the premise that contains the minor term

***Major* Premise**	All *mammals* are **animals with hearts**.
***Minor* Premise**	All **dogs** are *mammals*.
	All **dogs** are **animals with hearts**.

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II. **The Mood** of a Categorical Syllogism - the letters of the three propositions that compose the syllogism.

All mammals are animals with hearts.
All dogs are mammals. **AAA**
All dogs are animals with hearts.

No mammals are animals with hearts.
All dogs are mammals. **EAE**
No dogs are animals with hearts.

$4^3 (4 \times 4 \times 4) = 64$ *possible* **moods**

Some mammals are animals with hearts.
All dogs are mammals. **IAI**
Some dogs are animals with hearts.

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III. **The Figure** of the Categorical Syllogism - the *location of the middle term* in the major and minor premises

Figure 1

M are P. — All *mammals* are animals with hearts.
S are ***M***. — All dogs are *mammals*.
S are P. — All dogs are animals with hearts.

Figure 2

P are ***M***. — All animals with hearts are *mammals*.
S are ***M***. — All dogs are *mammals*.
S are P. — All dogs are animals with hearts.

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III. **The Figure** of the Categorical Syllogism - the *location of the middle term* in the major and minor premises

Figure 3

M are P. — All *mammals* are animals with hearts.

M are S. — All *mammals* are dogs.

S are P. — All dogs are animals with hearts.

Figure 4

P are ***M***. — All animals with hearts are *mammals*.

M are S. — All *mammals* are dogs.

S are P. — All dogs are animals with hearts.

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III. **The Figure** of the Categorical Syllogism - the *location of the middle term* in the major and minor ***premises***

Figure 1

M are P.
S are ***M***.

S are P.

Figure 2

P are ***M***.
S are ***M***.

S are P.

Figure 3

M are P.
M are S.

S are P.

Figure 4

P are ***M***.
M are S.

S are P.

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III. **The Figure** of the Categorical Syllogism - the *location of the middle term* in the major and minor premises

1	2	3	4
M are P.	P are ***M***.	***M*** are P.	P are ***M***.
S are ***M***.	S are ***M***.	***M*** are S.	***M*** are S.
S are P.	S are P.	S are P.	S are P.

4 ***figures***

4 ***figures*** x 64 ***moods*** = 256 **categorical syllogisms**

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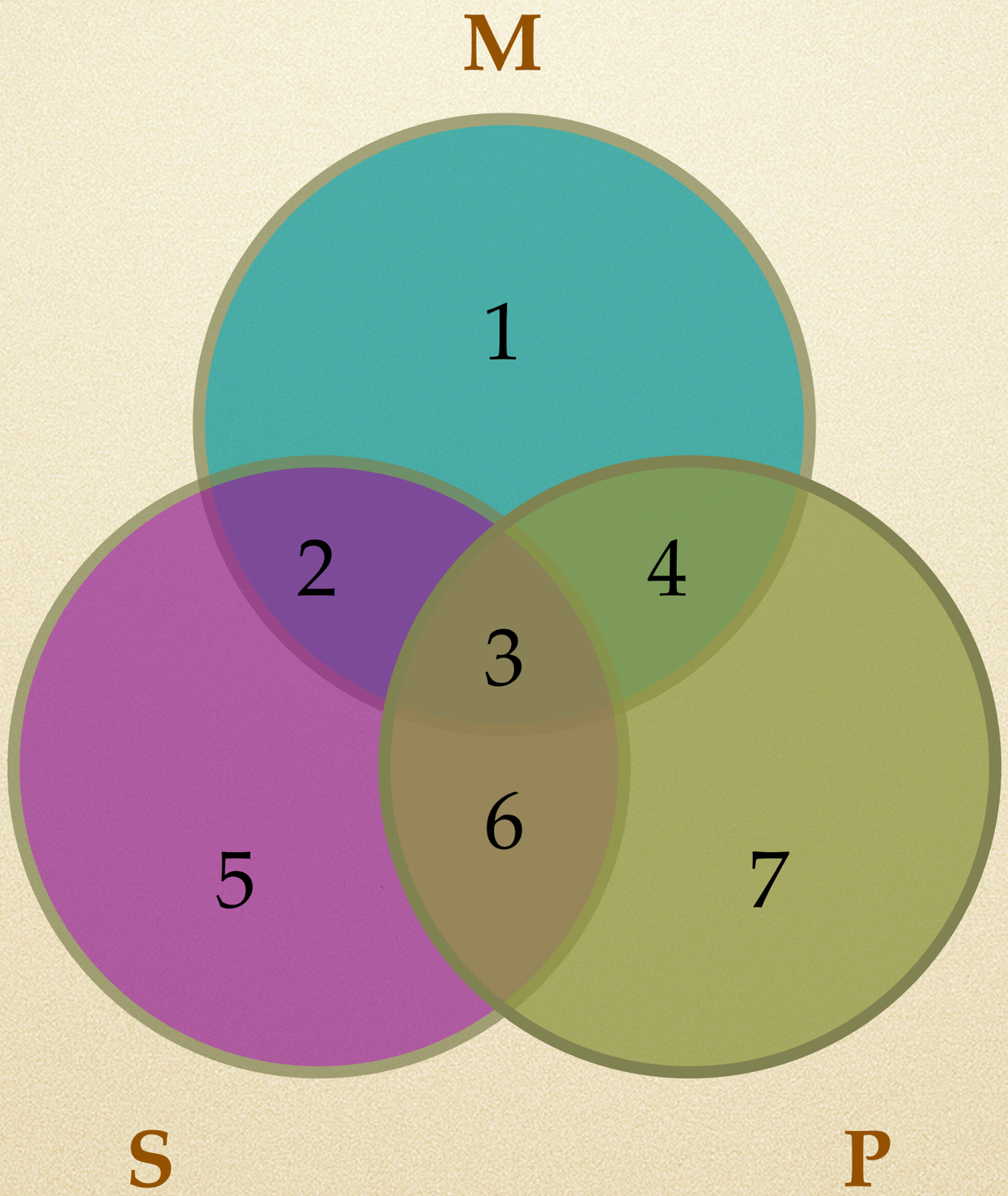

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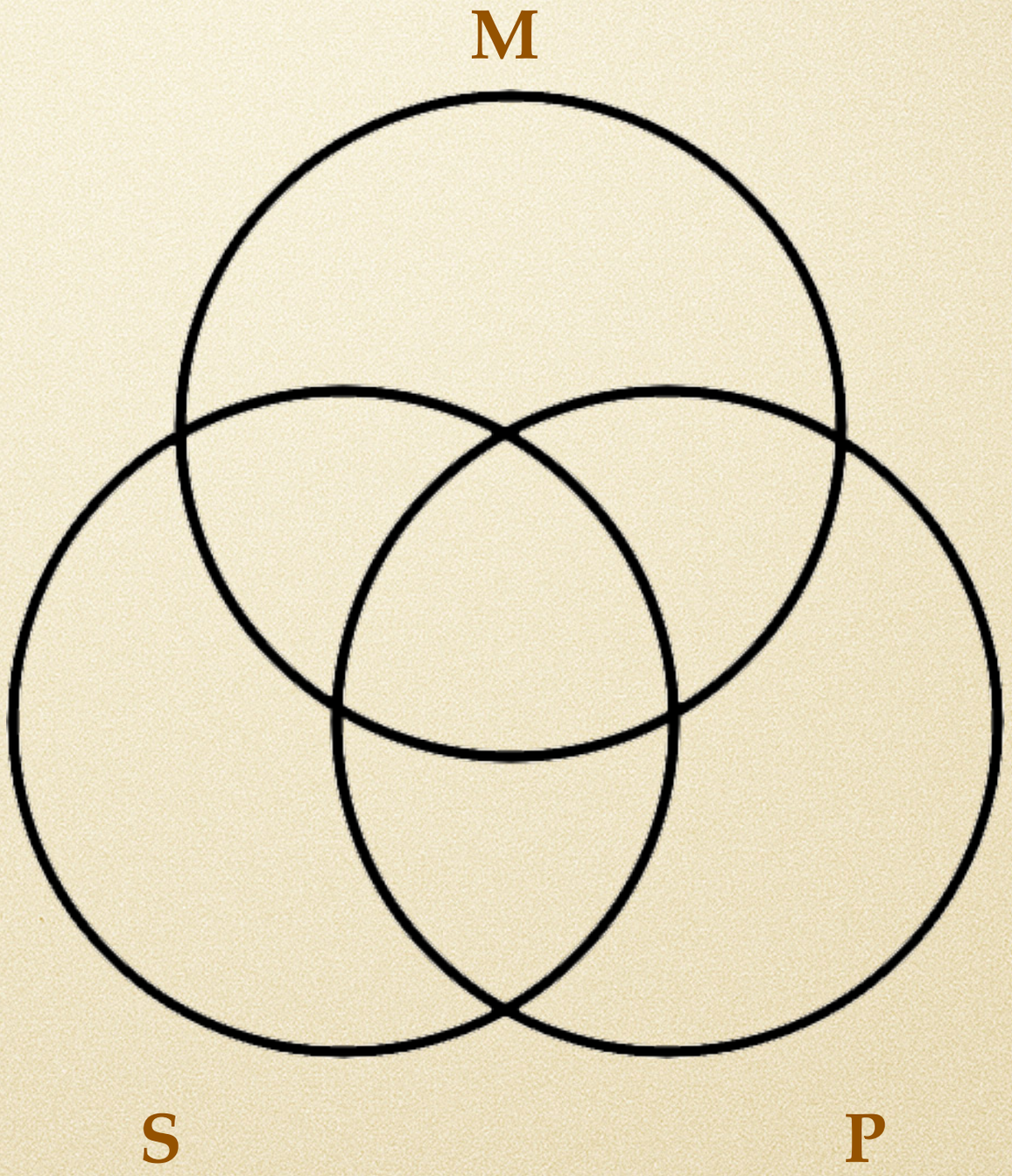
AAA-1

All M are P.
All S are M.
All S are P.



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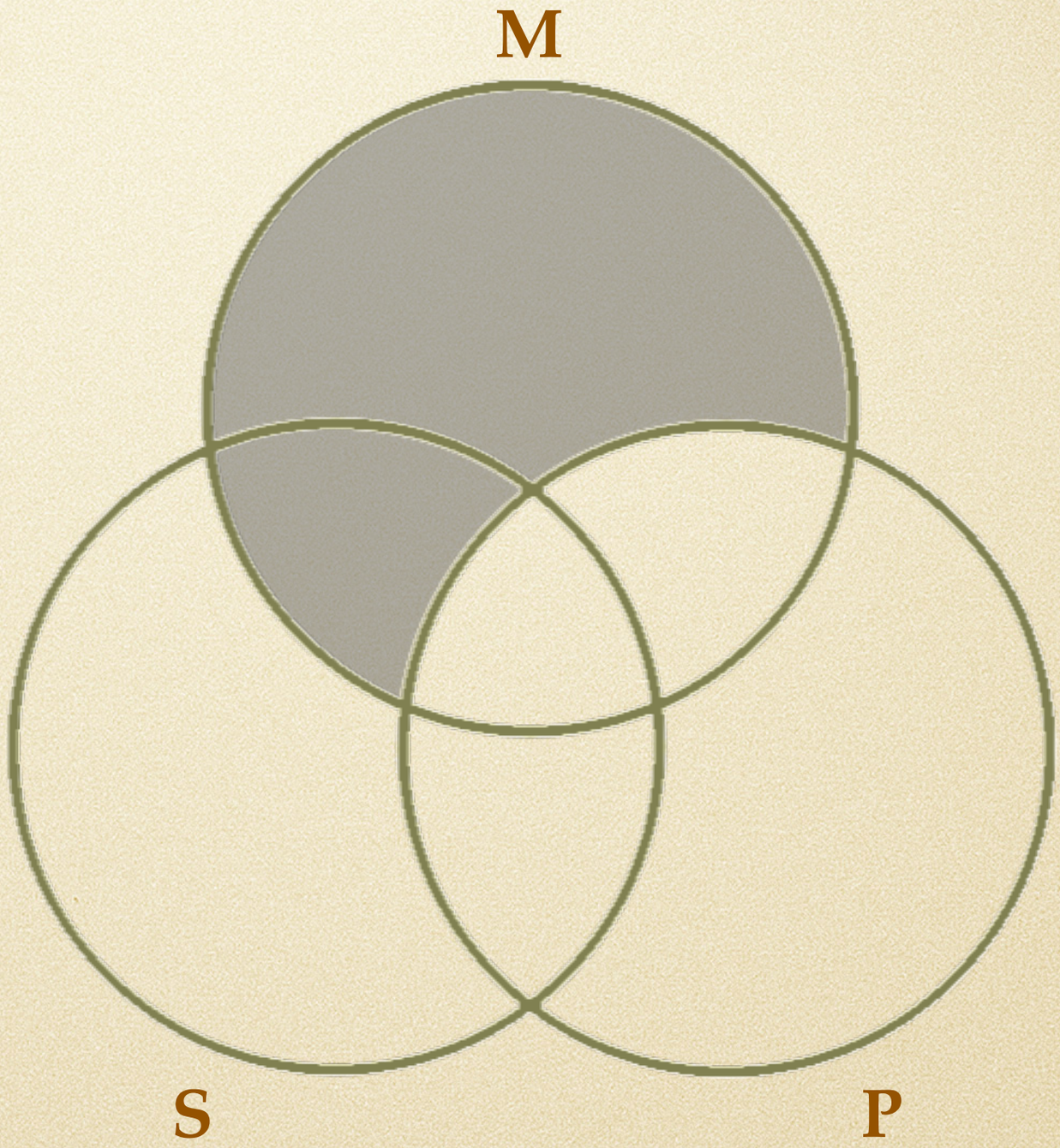
AAA-1

All M are P. ✓
All S are M.
All S are P.



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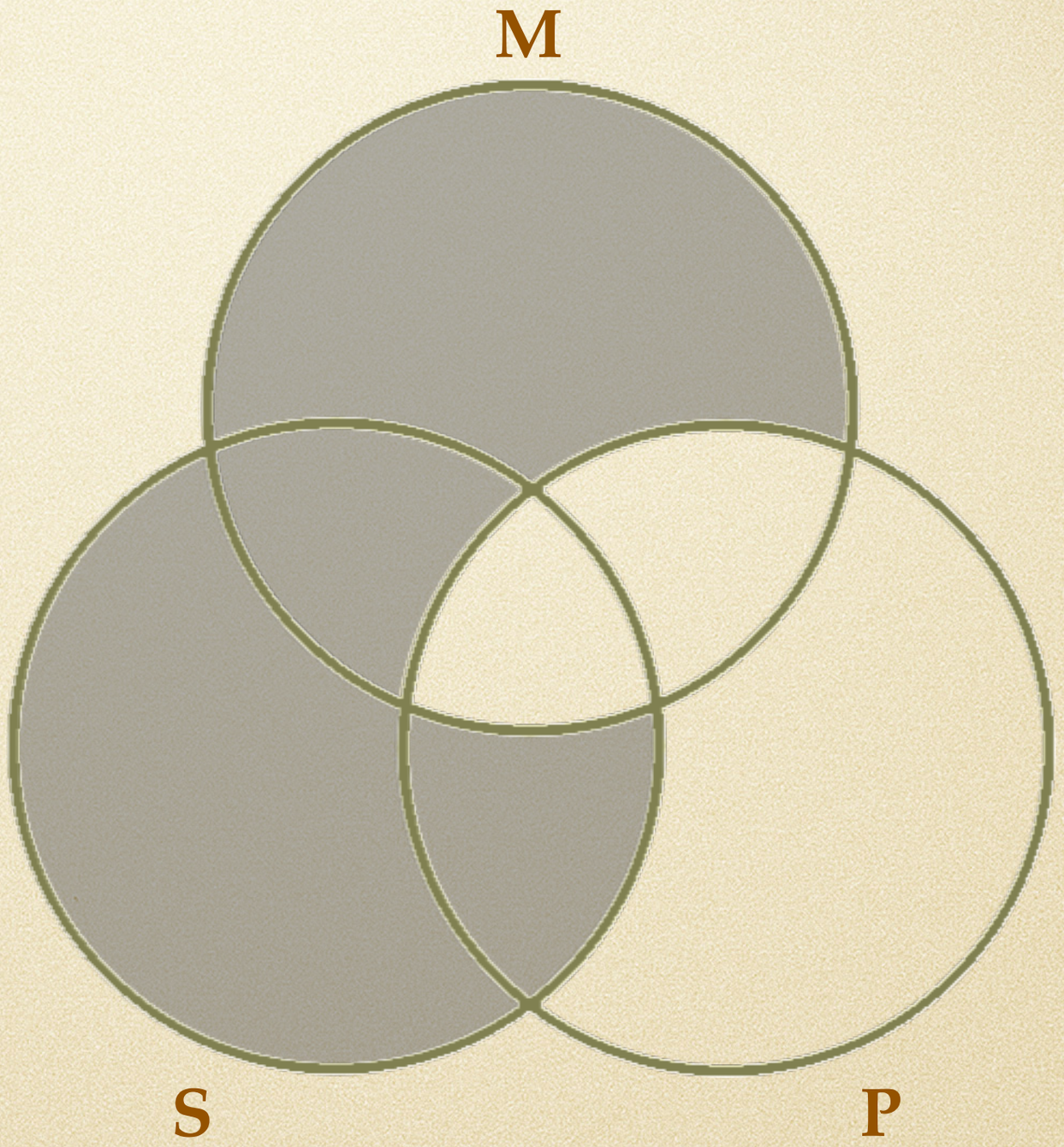
AAA-1

All M are P. ✓
All S are M. ✓
All S are P.

Valid



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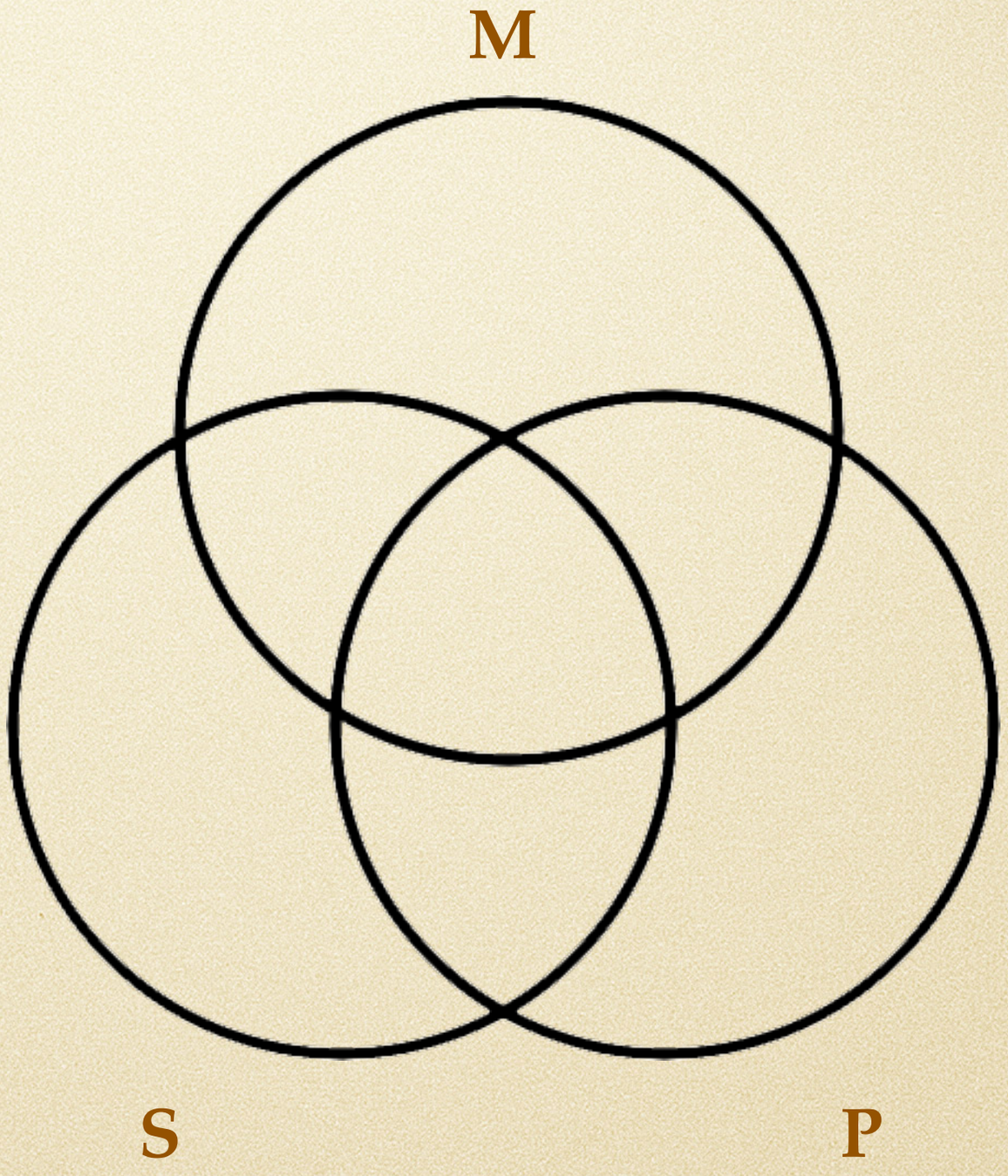
EIO-2

No P are M.
Some S are M.
Some S are not P.



NOTE: *always start with universal premises.*

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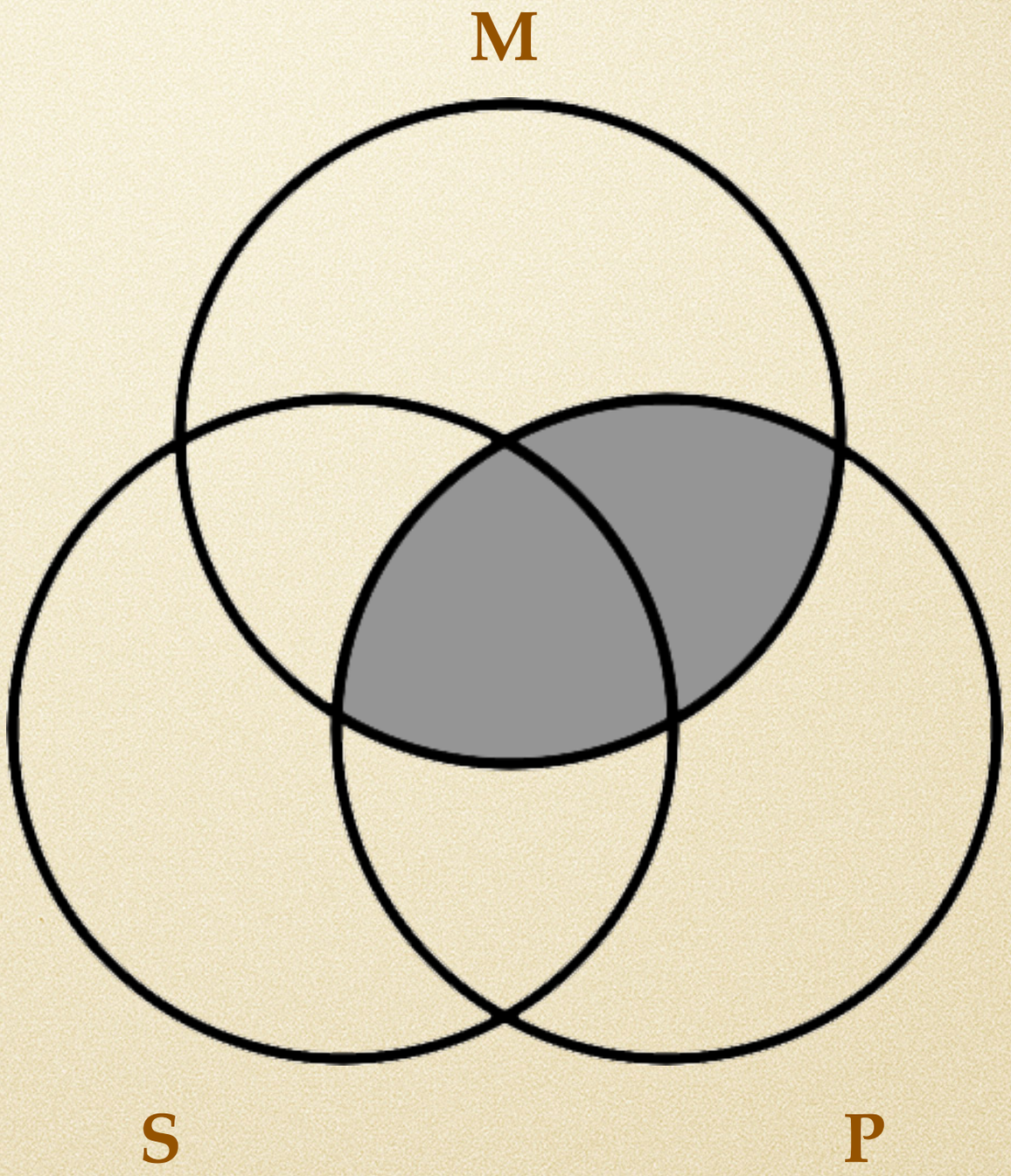
EIO-2

No P are M. ✓
Some S are M.
Some S are not P.



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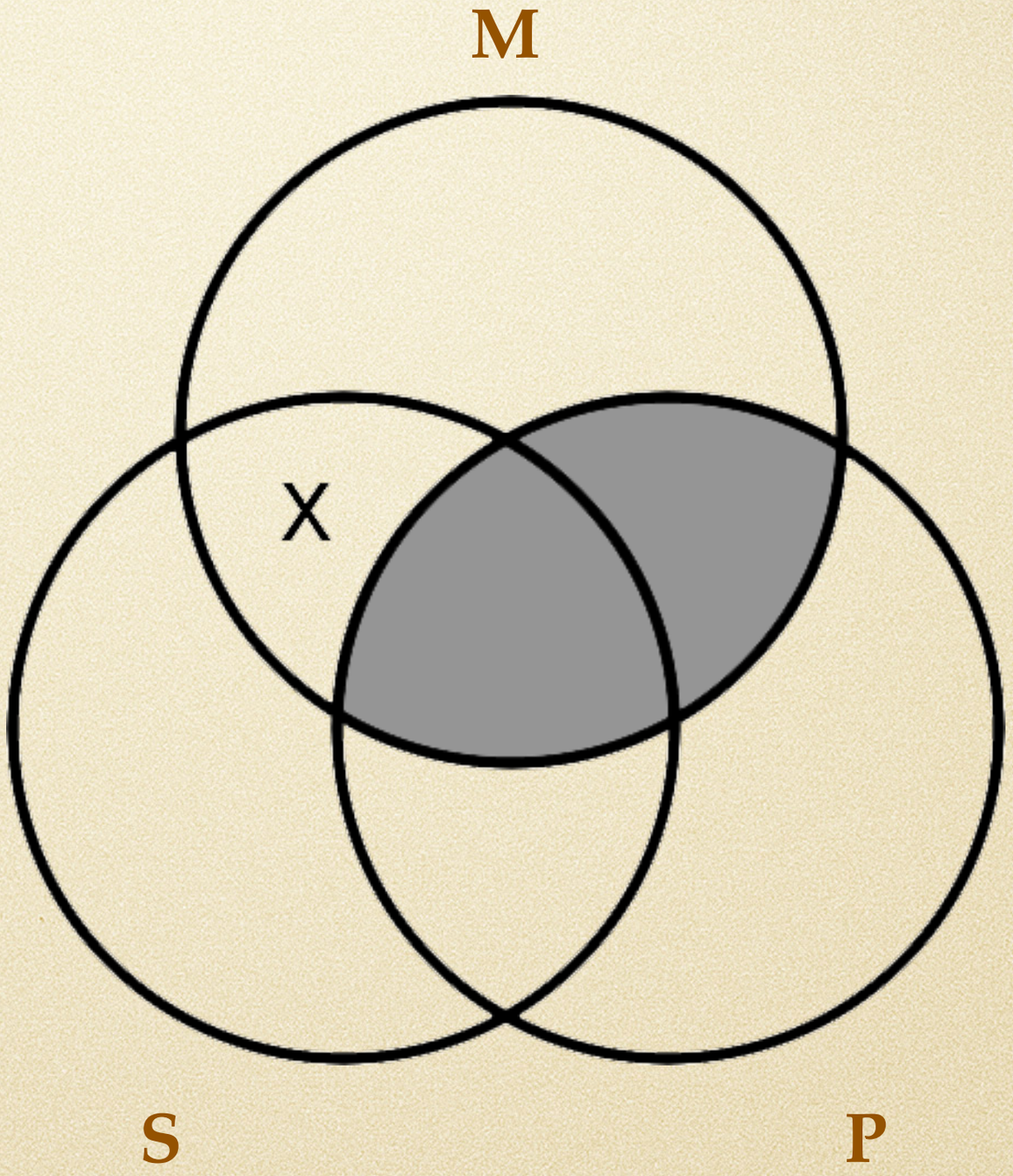
EIO-2

No P are M. ✓
Some S are M. ✓
Some S are not P.

Valid



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Syllogisms

IV. **The Fallacies** of Categorical Syllogisms - the five ways a categorical syllogism can ***fail***

A. **Undistributed Middle Term** - the middle term of a categorical syllogism **must** be distributed ***at least once***.

All dogs are *mammals*.
AAA-2 All cats are *mammals*.
Therefore, all cats are dogs

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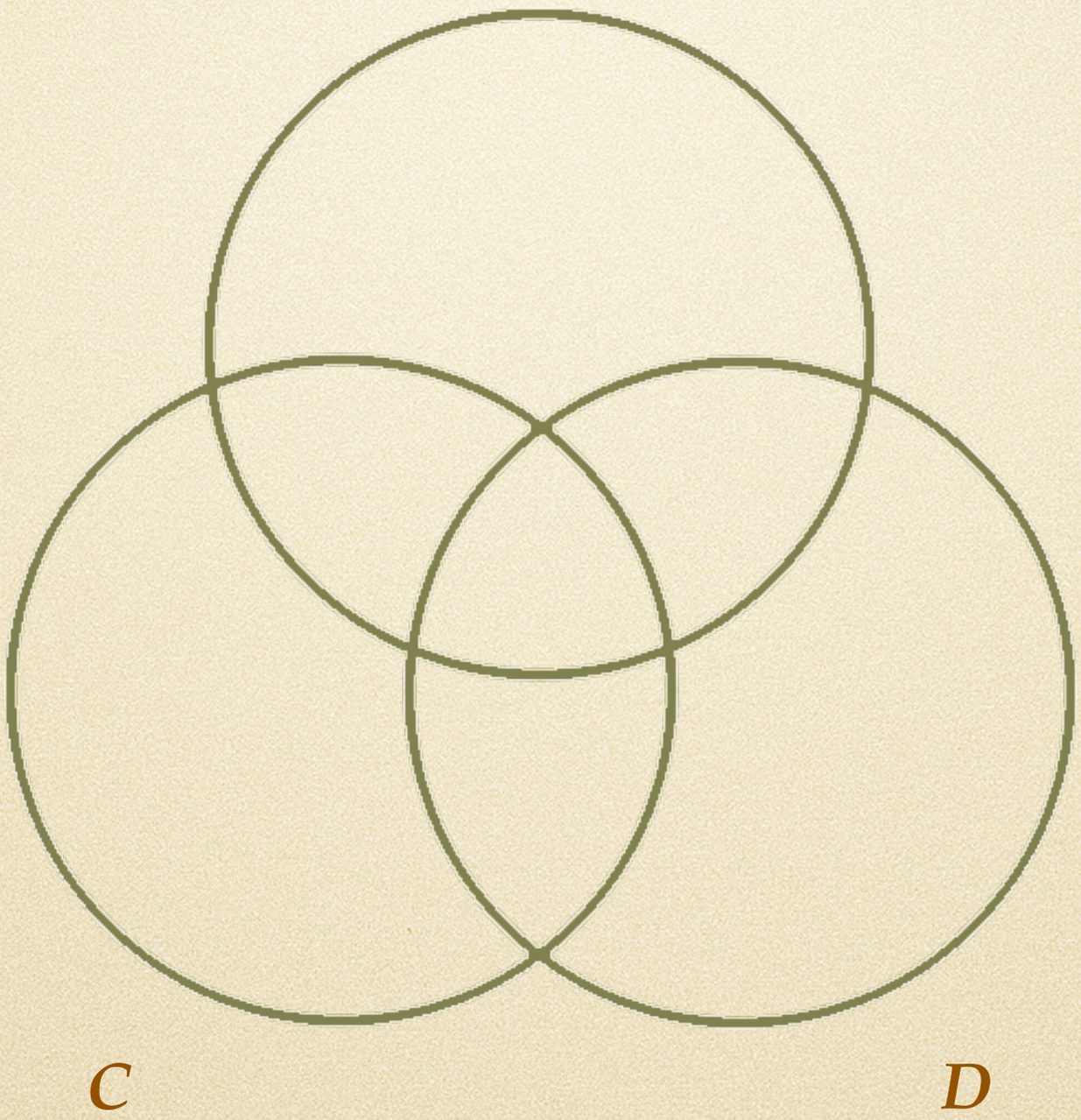
AAA-2



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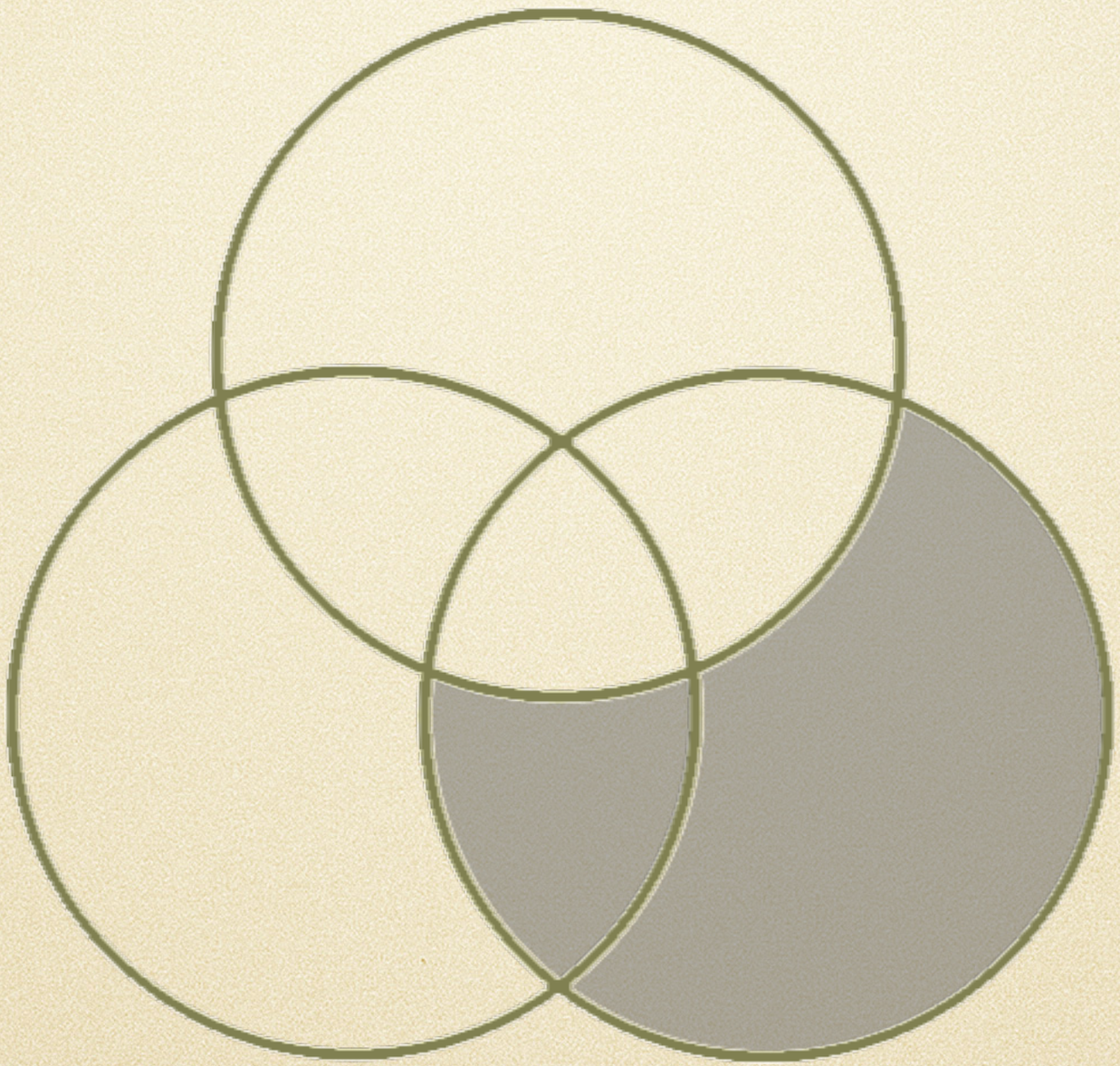
AAA-2



All dogs are *mammals*.

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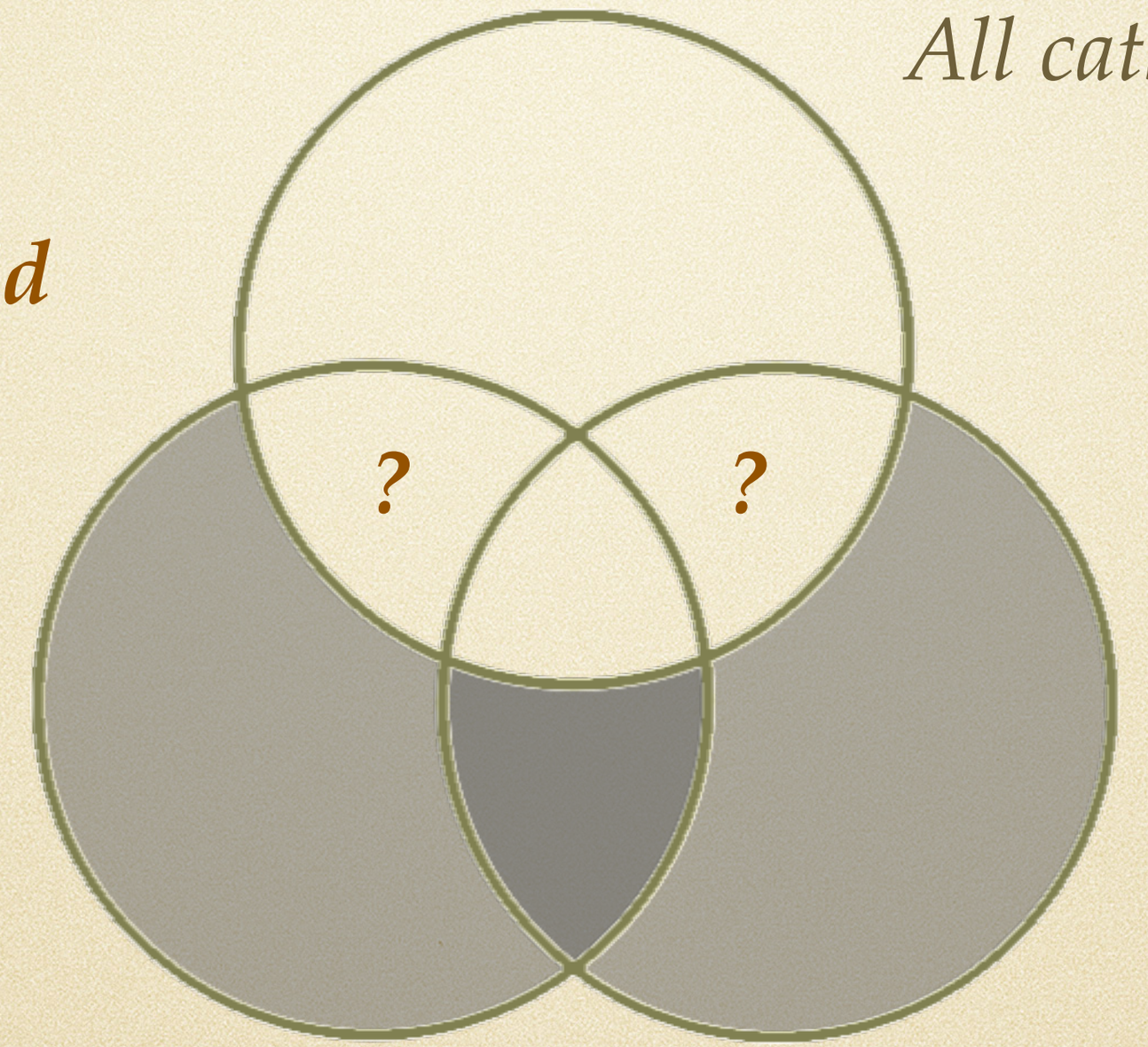
AAA-2

All cats are dogs?

Invalid



All cats are *mammals*.

All dogs are *mammals*.

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Syllogisms

IV. **The Fallacies** of Categorical Syllogisms - the five ways a categorical syllogism can fail

A. **Undistributed Middle Term** - the middle term of a categorical syllogism must be distributed ***at least once***.

B. **Illicit Major/Minor Term** - if a term is distributed in the conclusion, it ***must*** be distributed in its premise.

All dogs are *mammals*.
Some cats are not dogs.
Therefore, some cats are *not mammals*.

AOO-1

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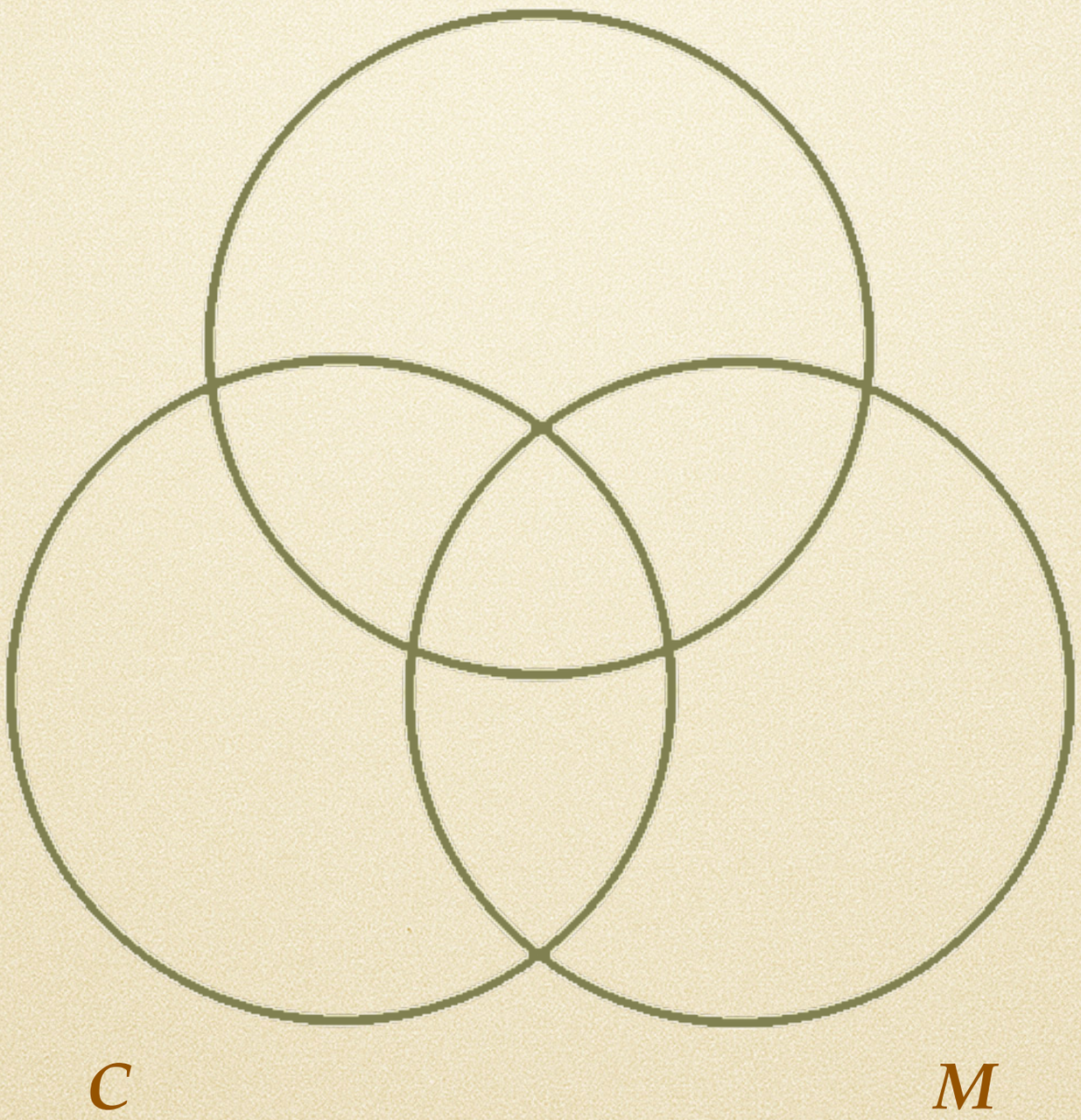
AOO-1



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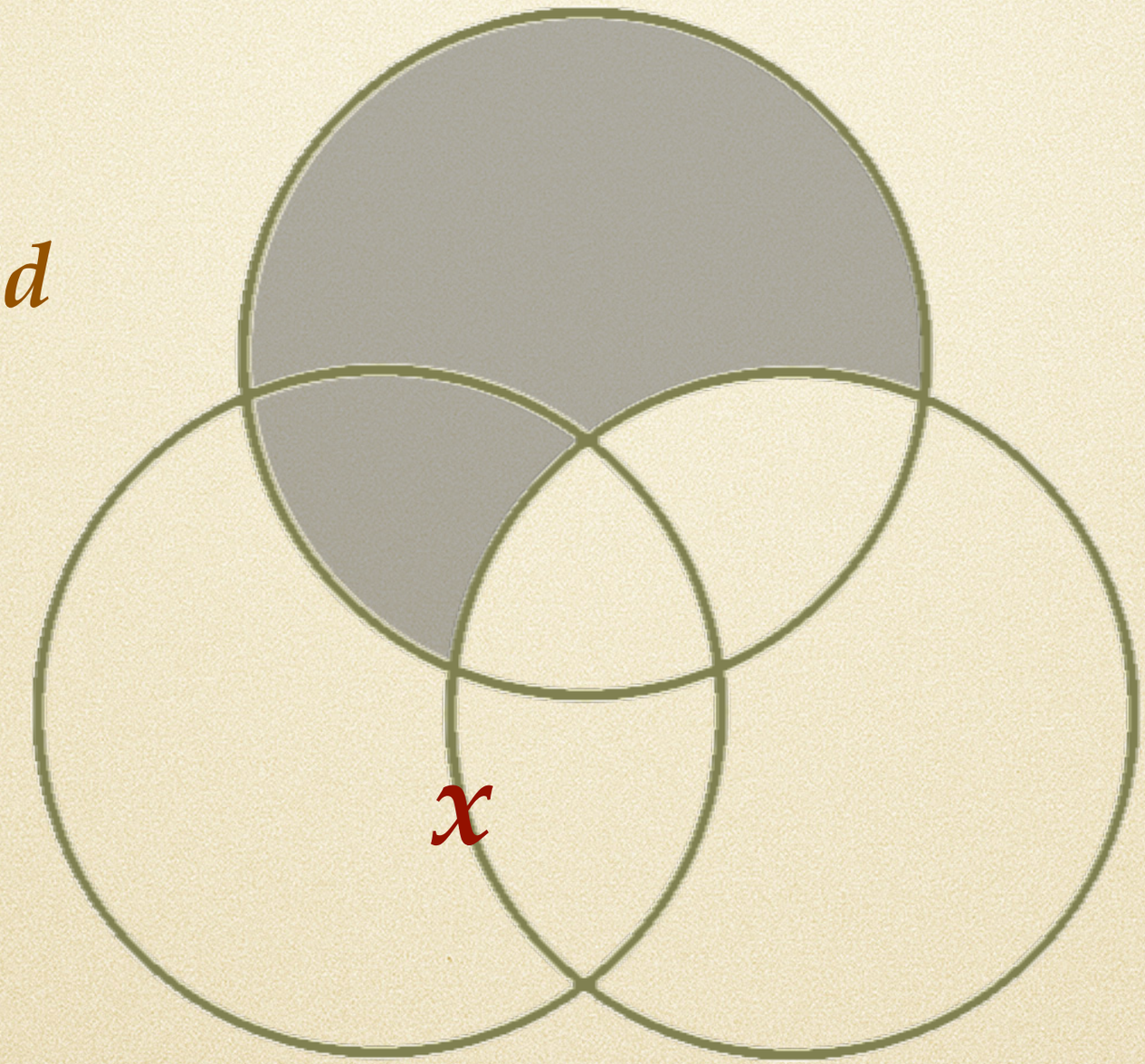
AOO-1

Invalid

D

Some cats are not mammals?



C

M

Some cats are not dogs.

All dogs are *mammals*.

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IV. **The Fallacies** of Categorical Syllogisms - the five ways a categorical syllogism can fail:

A. **Undistributed Middle Term** - the middle term of a categorical syllogism must be distributed ***at least once***.

B. **Illicit Major/Minor Term** - if a term is distributed in the conclusion, it ***must*** be distributed in the premise.

C. **Exclusive Premises** - A categorical syllogism ***cannot*** have two negative premises.

EOO-1

No fish are birds.
Some parrots are ***not*** fish.
Therefore, some parrots are not birds.

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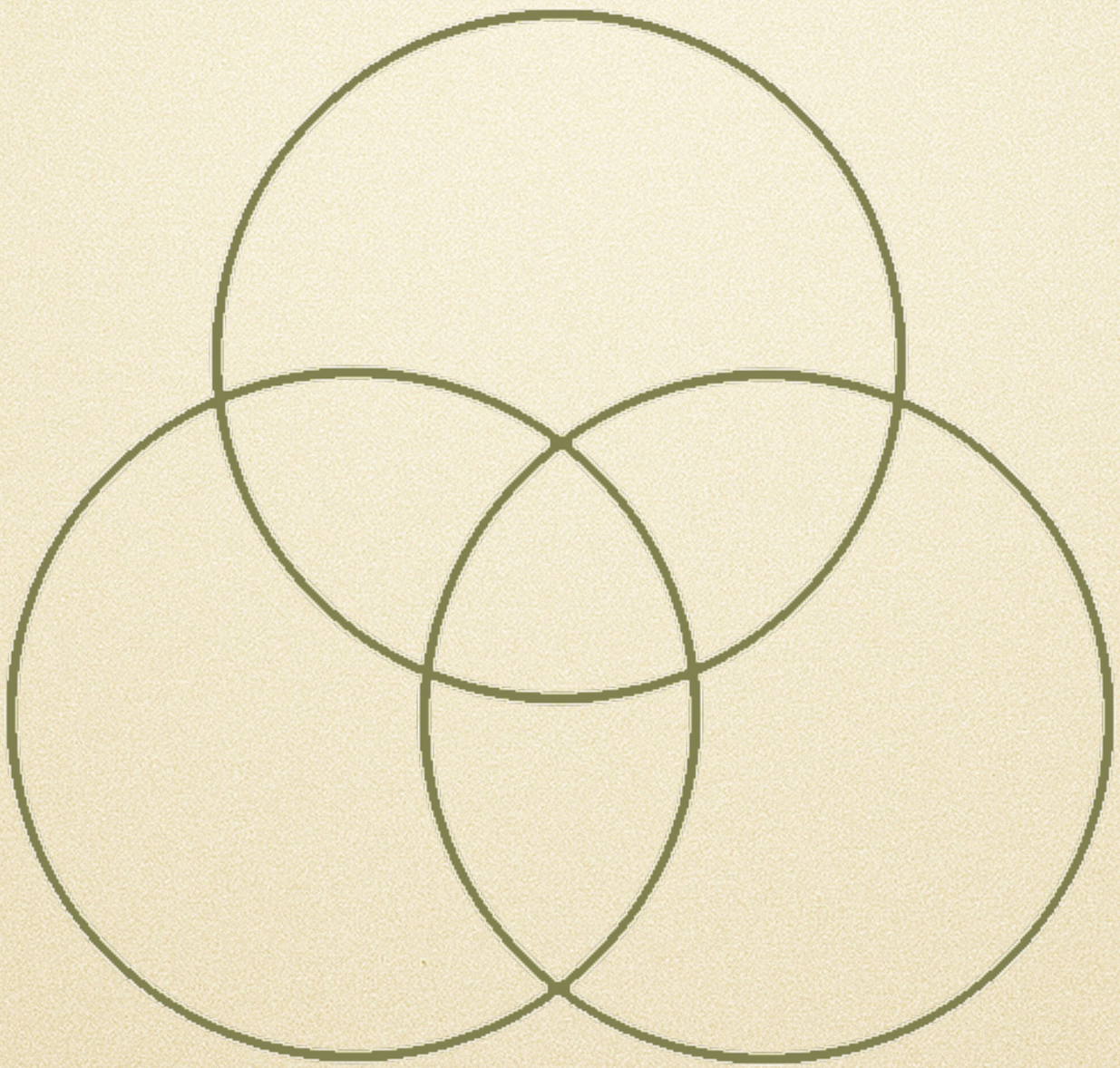
EOO-1



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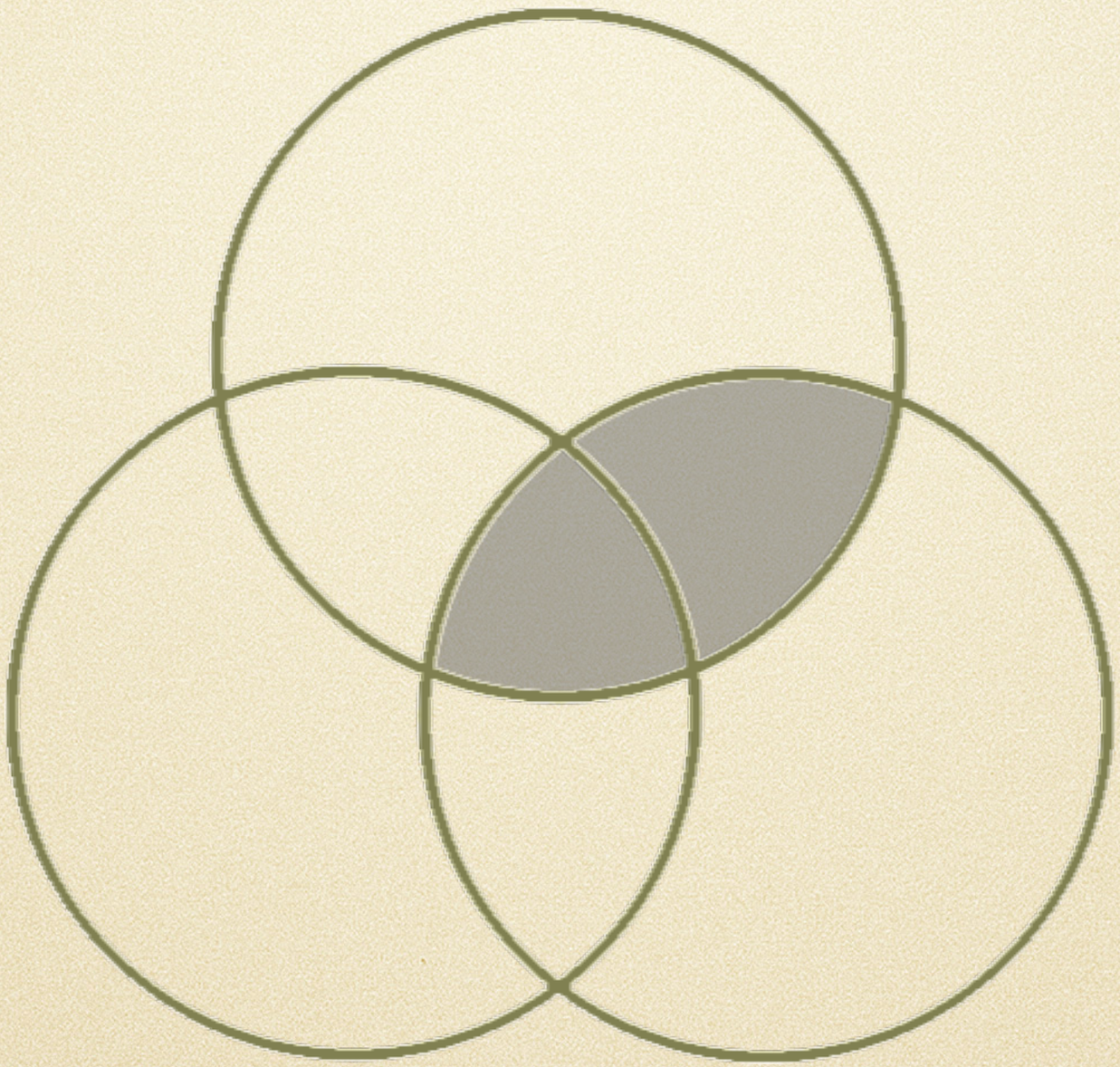
EOO-1



No fish are birds.

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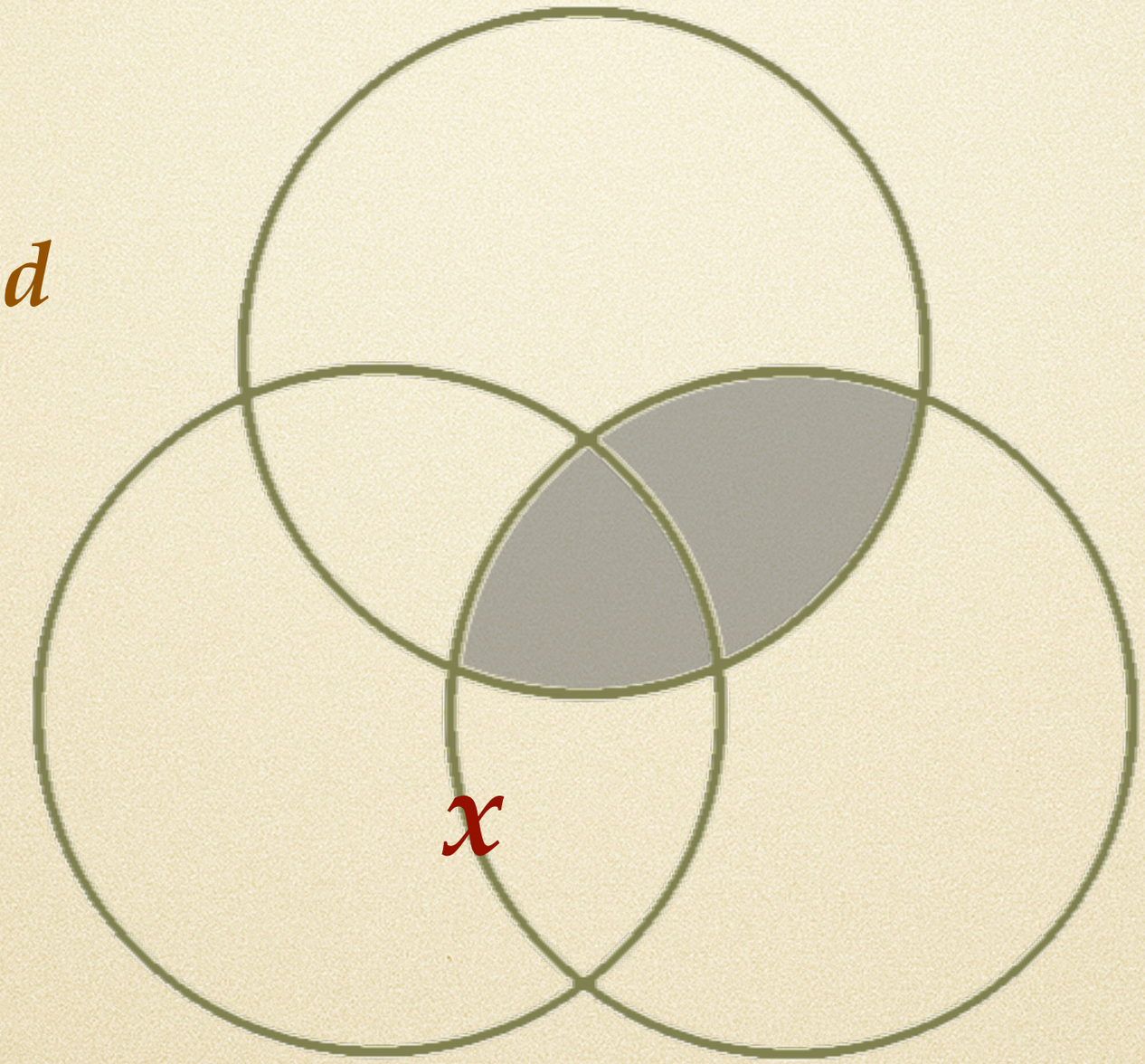
Syllogisms

EOO-1

Invalid

F *Some parrots are not birds?*



P ***B***

Some parrots are ***not*** fish.

No fish are birds.

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A. **Undistributed Middle Term** - the middle term of a categorical syllogism must be distributed ***at least once***.

B. **Illicit Major/Minor Term** - if a term is distributed in the conclusion, it ***must*** be distributed in the premise.

C. **Exclusive Premises** - A categorical syllogism ***cannot*** have two negative premises.

D. **Losing the Negative** - A negative premise ***requires*** a negative conclusion (*and a negative conclusion requires a*

EII-1

No fish are birds.
Some parrots are fish.
Therefore, some parrots are birds.

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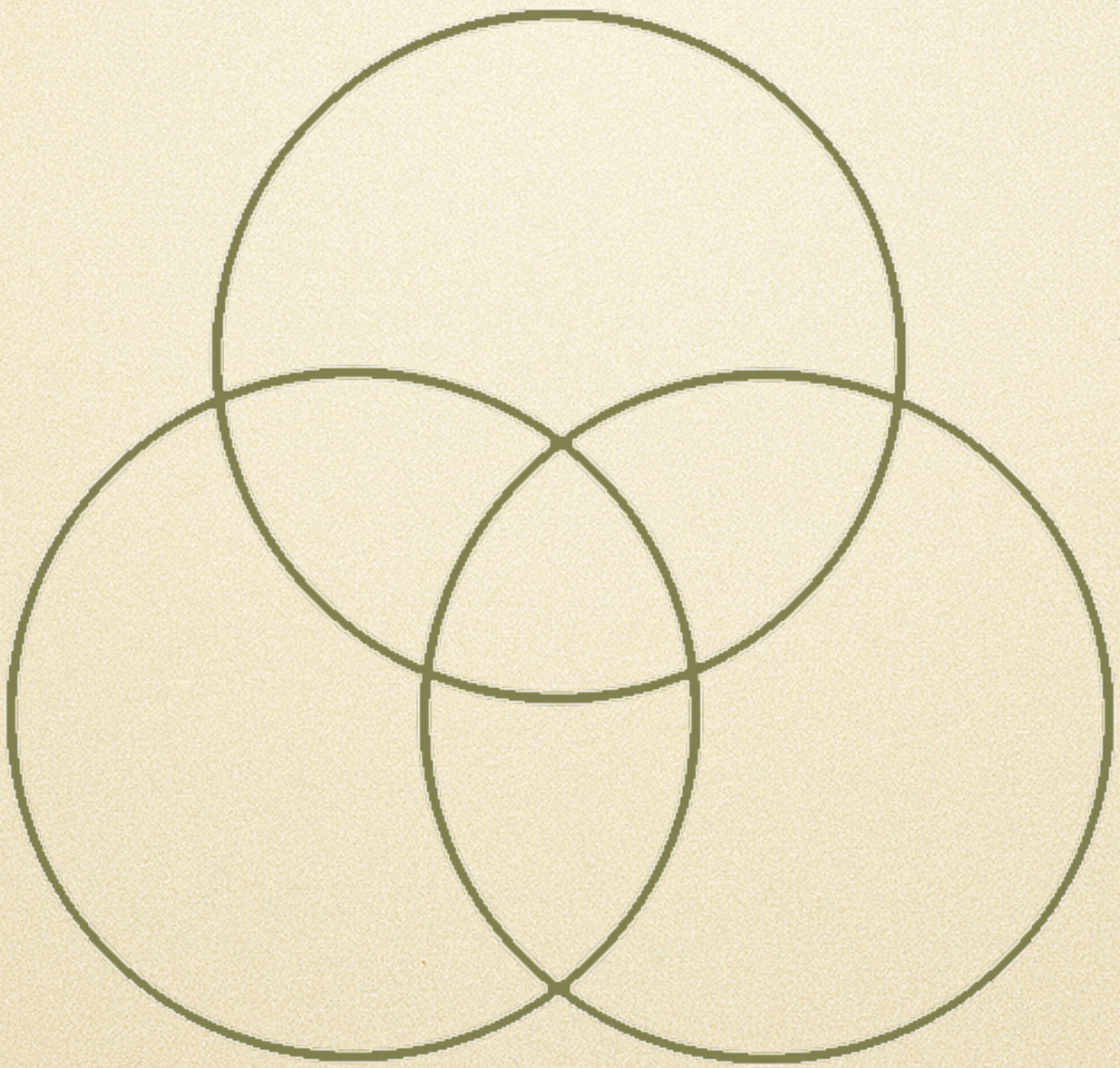
EII-1



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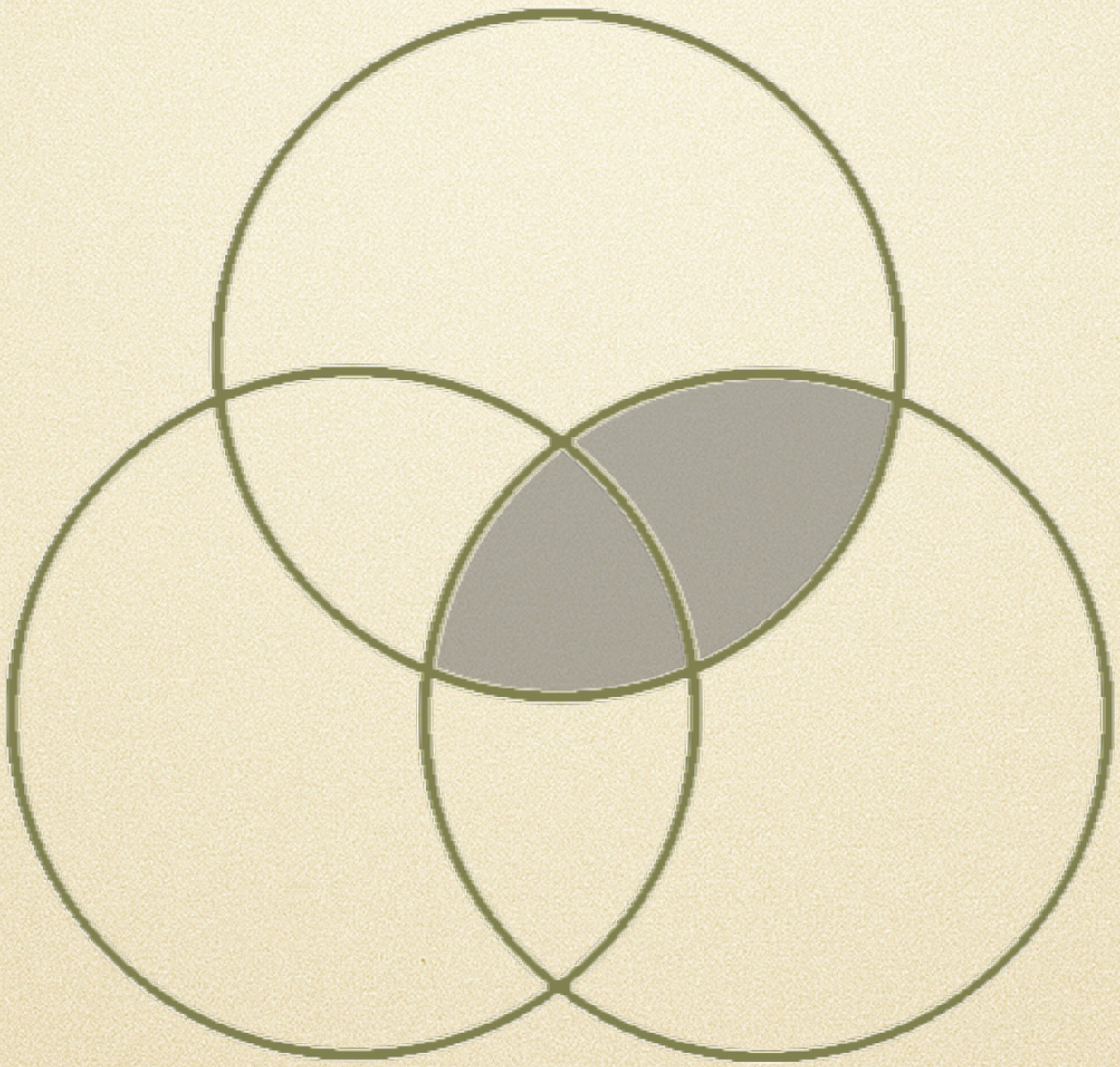
EII-1



No fish are birds.

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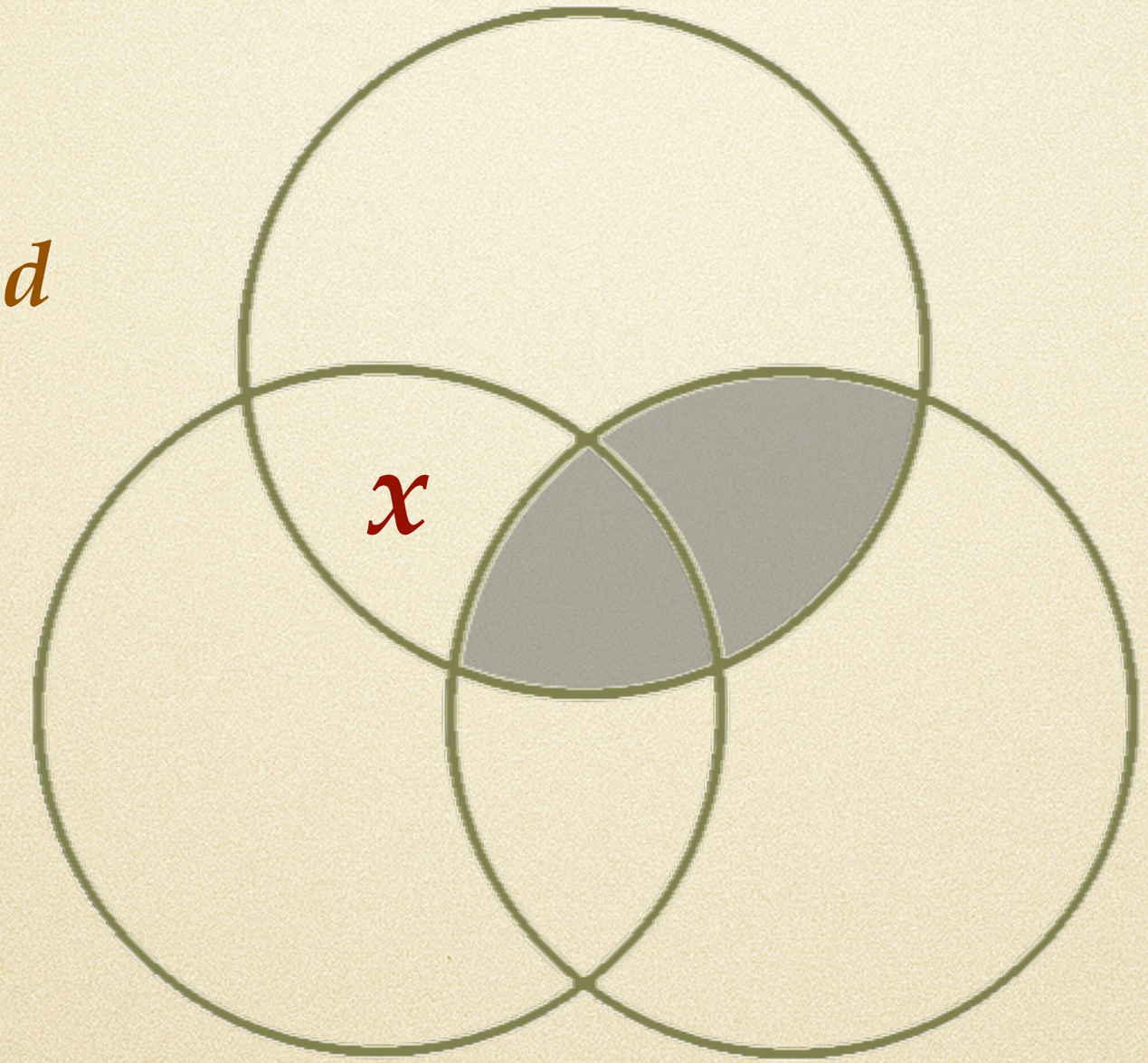
F

Some parrots are birds?

EII-1

Invalid



Some parrots are fish.

No fish are birds.

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IV. **The Fallacies** of Categorical Syllogisms - the five ways a categorical syllogism can fail:

A. **Undistributed Middle Term** - the middle term of a categorical syllogism must be distributed ***at least once***.

B. **Illicit Major/Minor Term** - if a term is distributed in the conclusion, it ***must*** be distributed in the premise.

C. **Exclusive Premises** - A categorical syllogism ***cannot*** have two negative premises.

D. **Losing the Negative** - A negative premise ***requires*** a negative conclusion (*and a negative conclusion requires a negative premise*).

E. ***Existential Fallacy**** - A particular conclusion ***cannot*** be derived from two universal premises

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V. **The Valid** Categorical Syllogisms - 24 Valid syllogisms:

***Un*conditionally Valid: 15**

Figure 1	Figure 2	Figure 3	Figure 4
AAA	EAE	IAI	AEE
EAE	AEE	AII	IAI
AII	EIO	OAO	EIO
EIO	AOO	EIO	

Conditionally Valid: 9

Figure 1	Figure 2	Figure 3	Figure 4	
AAI	AEO		AEO	*if* **S** exists
EAO	EAO			
		AAI	EAO	*if* **M** exists
		EAO		
			AAI	*if* **P** exists