Other Logical Notions

PHIL 500

September 4th, 2019

Outline

Joint Possibility and Joint Impossibility

Validity and Joint Impossibility

Necessary Truths, Necessary Falsehoods, and Contingencies

Validity and Invalidity

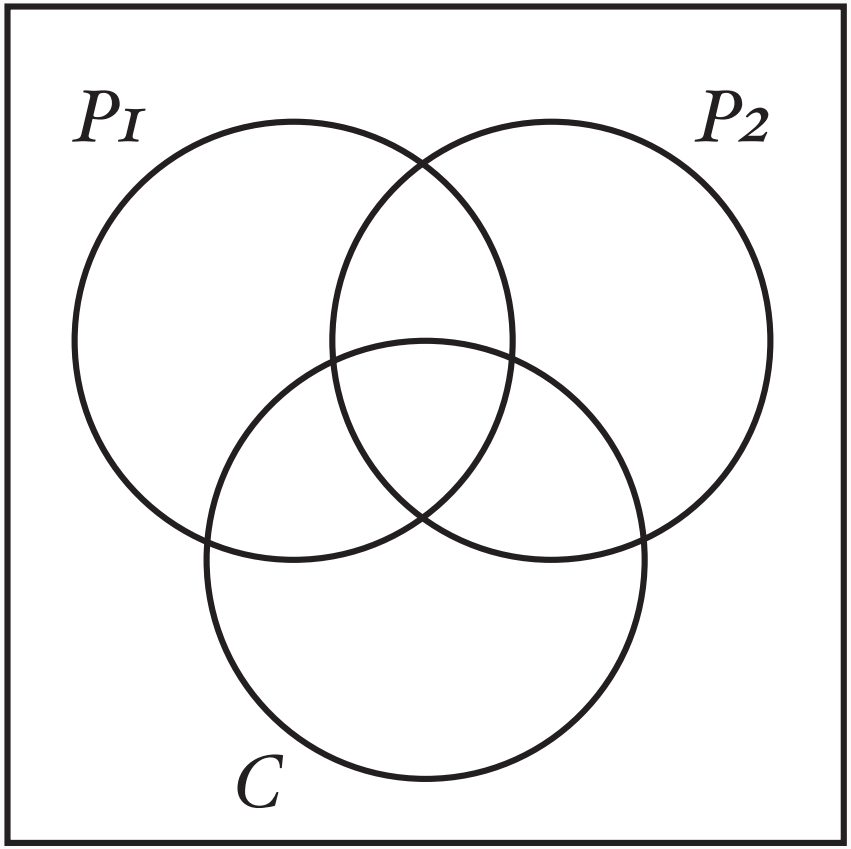
Validity

If an argument is *valid*, then it is impossible for its premises to all be true while its conclusion is simultaneously false.

Invalidity

If an argument is *invalid*, then it is possible for its premises to all be true while its conclusion is simultaneously false.

Validity and Invalidity



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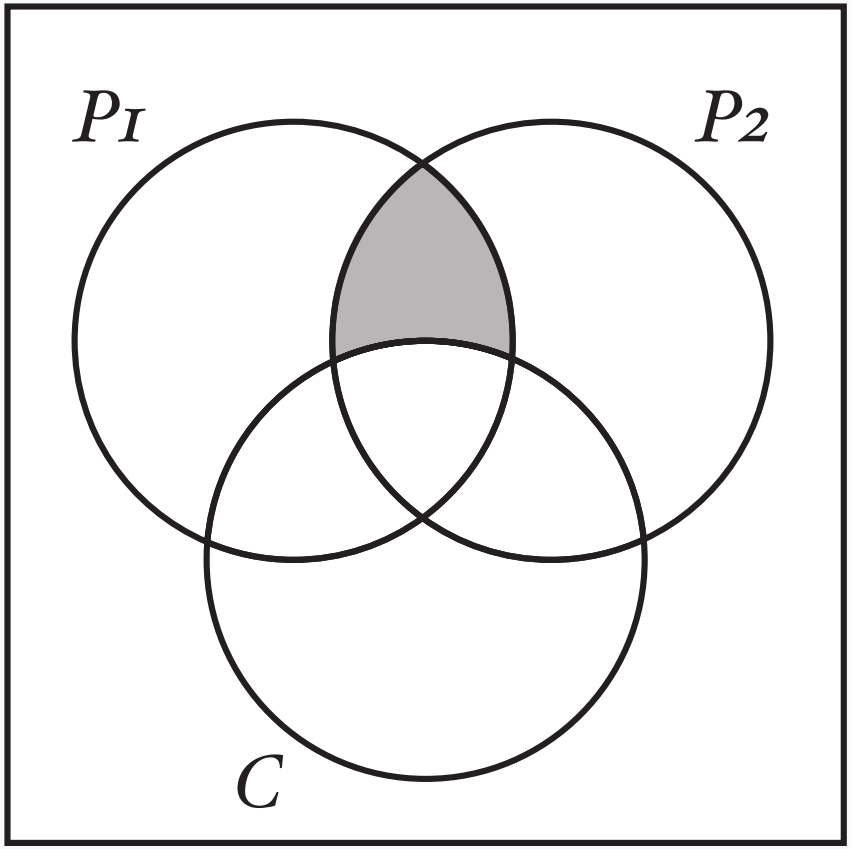

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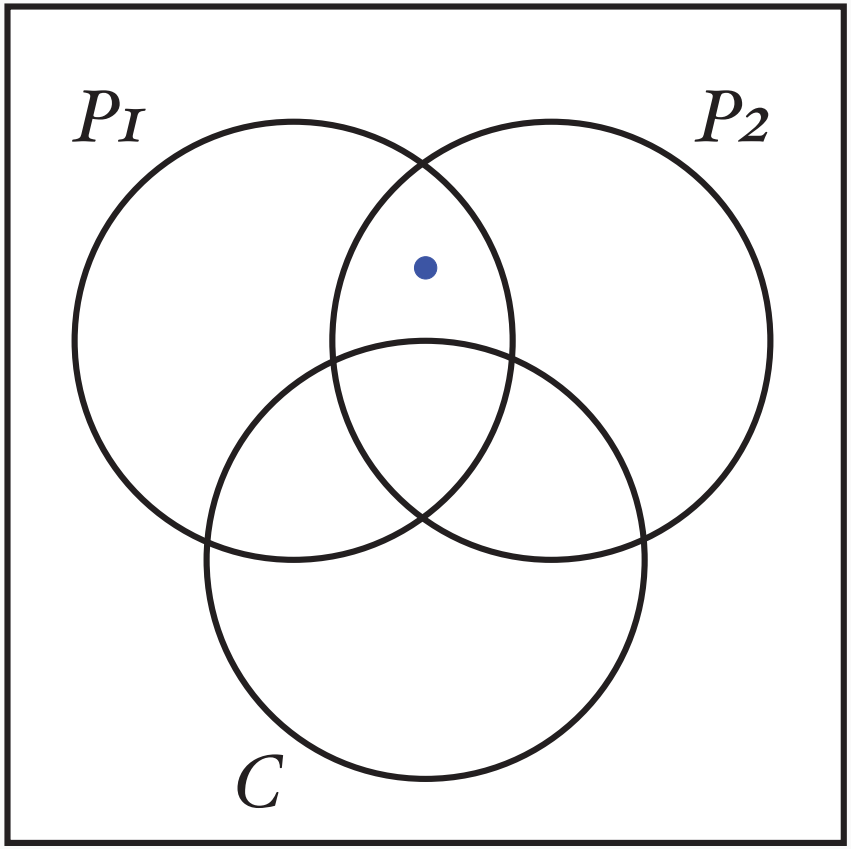

Validity and Invalidity

People younger than 21 aren't allowed to drink

Sam is 22

$\therefore$ Sam is allowed to drink

Validity and Invalidity

People younger than 21 aren't allowed to drink

Sam is 22

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Validity and Invalidity

People older than 21 aren't allowed to drink

Sam is 22

$\therefore$ Sam isn't allowed to drink

Validity and Invalidity

People older than 21 aren't allowed to drink

Sam is 22

$\therefore$ Sam isn't allowed to drink

Validity and Invalidity

Chocolate and caramel are both tasty

Protectionism is a good trade policy

$\therefore$ Chocolate is tasty

Validity and Invalidity

Chocolate and caramel are both tasty

Protectionism is a good trade policy

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Validity and Invalidity

Eating soap cures cancer

$\therefore$ Either Trump will win in 2020 or he won't

Validity and Invalidity

Eating soap cures cancer

$\therefore$ Either Trump will win in 2020 or he won't

Special Cases of Validity

Validity

If an argument is *valid*, then it is impossible for its premises to all be true while its conclusion is simultaneously false.

- If it's impossible for the conclusion to be false, then the argument must be valid.

Validity and Invalidity

Trump will win in 2020 and Trump will not win in 2020

$\therefore$ Eating soap cures cancer

Validity and Invalidity

Trump will win in 2020 and Trump will not win in 2020

$\therefore$ Eating soap cures cancer

Special Cases of Validity

Validity

If an argument is *valid*, then it is impossible for its premises to all be true while its conclusion is simultaneously false.

- If it's impossible for the premises to all be true, then the argument must be valid.

Validity and Invalidity

Either Trump will win in 2020 or he won't

$\therefore$ Trump will win in 2020

Validity and Invalidity

Either Trump will win in 2020 or he won't

$\therefore$ Trump will win in 2020

Outline

Joint Possibility and Joint Impossibility

Validity and Joint Impossibility

Necessary Truths, Necessary Falsehoods, and Contingencies

Joint Possibility and Joint Impossibility

- Whenever it rains, I go shopping

Joint Possibility and Joint Impossibility

- Whenever it rains, I go shopping
- Last Tuesday, I didn't go shopping

Joint Possibility and Joint Impossibility

- Whenever it rains, I go shopping
- Last Tuesday, I didn't go shopping
- It rained last Tuesday

Joint Possibility and Joint Impossibility

Joint Possibility

Statements are *jointly possible* if and only if it is possible for them to all be true together.

Joint Impossibility

Statements are *jointly impossible* if and only if it is impossible for them to all be true together.

Joint Possibility and Joint Impossibility

- A test: try to imagine a scenario in which all of the statements are true at once.

Joint Possibility and Joint Impossibility

- A test: try to imagine a scenario in which all of the statements are true at once.
- If you can: then they are *jointly possible*.

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Joint Possibility and Joint Impossibility

- A test: try to imagine a scenario in which all of the statements are true at once.
- If you can: then they are *jointly possible*.
- If you cannot: then they are *jointly impossible*.
- ▹ Although...maybe you just weren't creative enough...how can we be sure that there really *isn't* a possibility like that?

Joint Possibility and Joint Impossibility

- Everyone who takes the exam passes

Joint Possibility and Joint Impossibility

- Everyone who takes the exam passes
- Bob doesn't take the exam

Joint Possibility and Joint Impossibility

- Everyone who takes the exam passes
- Bob doesn't take the exam
- Bob passes

Joint Possibility and Joint Impossibility

- Everyone who takes the exam passes
- Bob doesn't take the exam
- Bob passes

Joint Possibility and Joint Impossibility

- I only talked to the first person I saw at the party

Joint Possibility and Joint Impossibility

- I only talked to the first person I saw at the party
- The person I talked to didn't seem happy to see me

Joint Possibility and Joint Impossibility

- I only talked to the first person I saw at the party
- The person I talked to didn't seem happy to see me
- If I saw Sally at the party, then I talked to her

Joint Possibility and Joint Impossibility

- I only talked to the first person I saw at the party
- The person I talked to didn't seem happy to see me
- If I saw Sally at the party, then I talked to her
- Sally is never happy to see me

Joint Possibility and Joint Impossibility

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- The person I talked to didn't seem happy to see me
- If I saw Sally at the party, then I talked to her
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- I saw Sally at the party, but she wasn't the first person I saw

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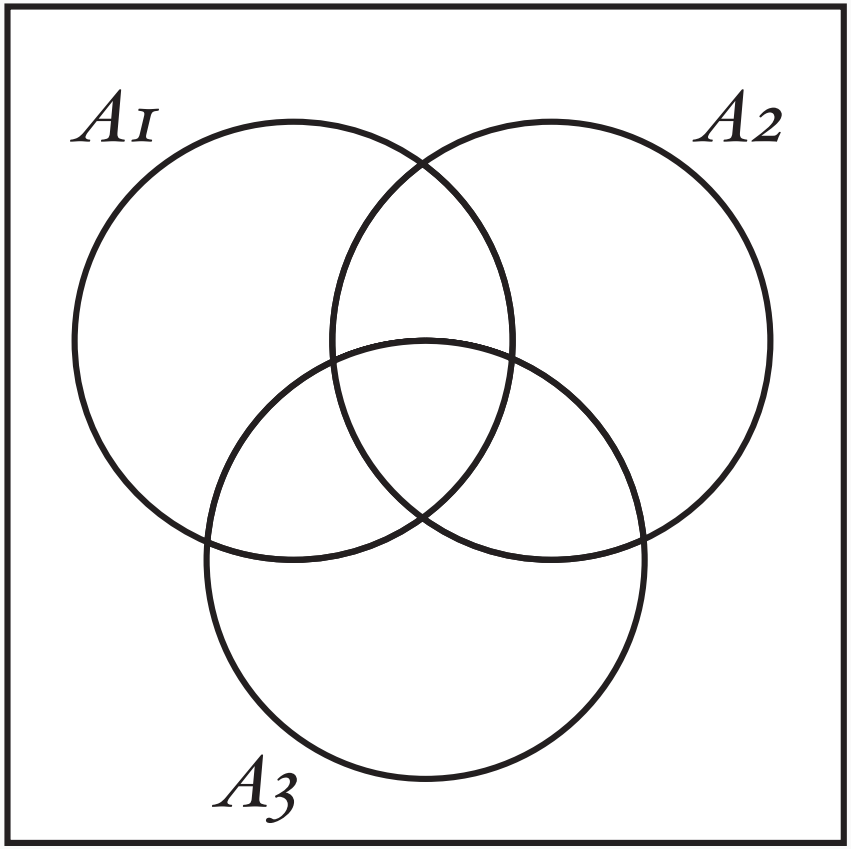
Joint Possibility and Joint Impossibility



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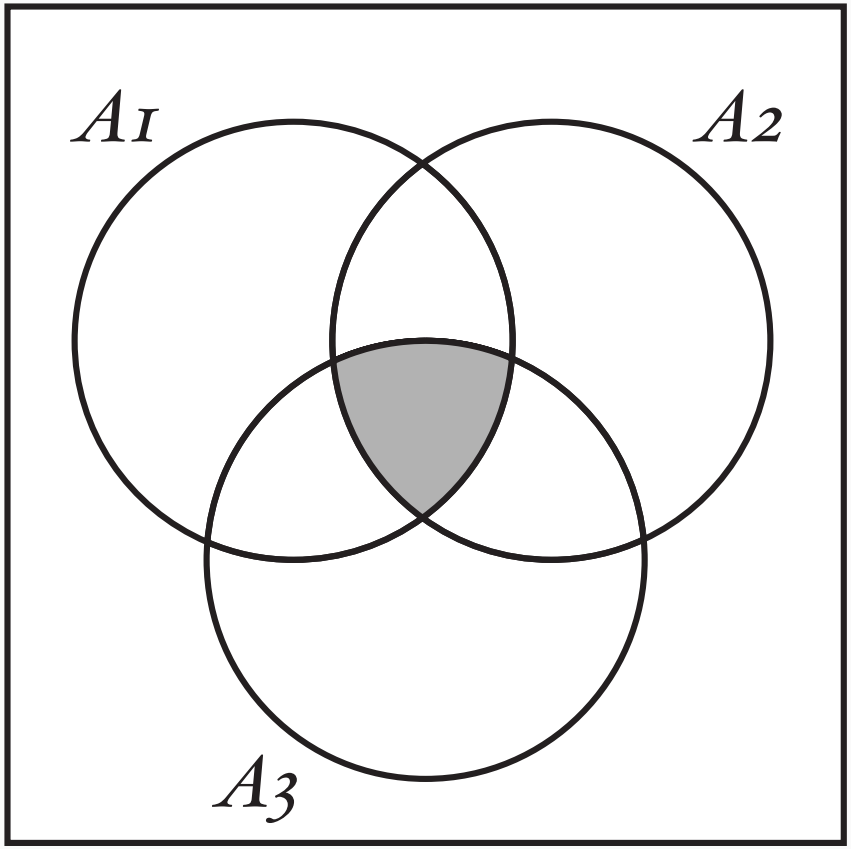

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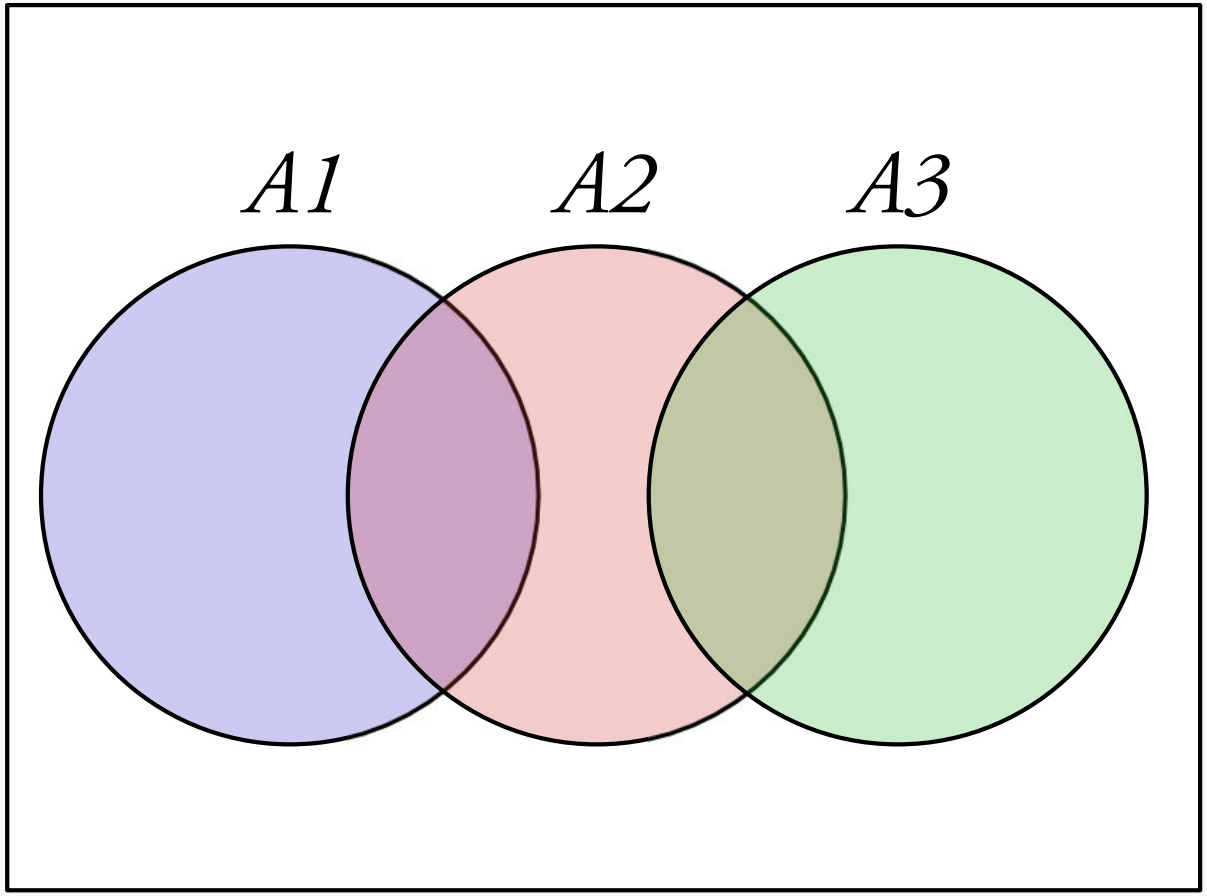

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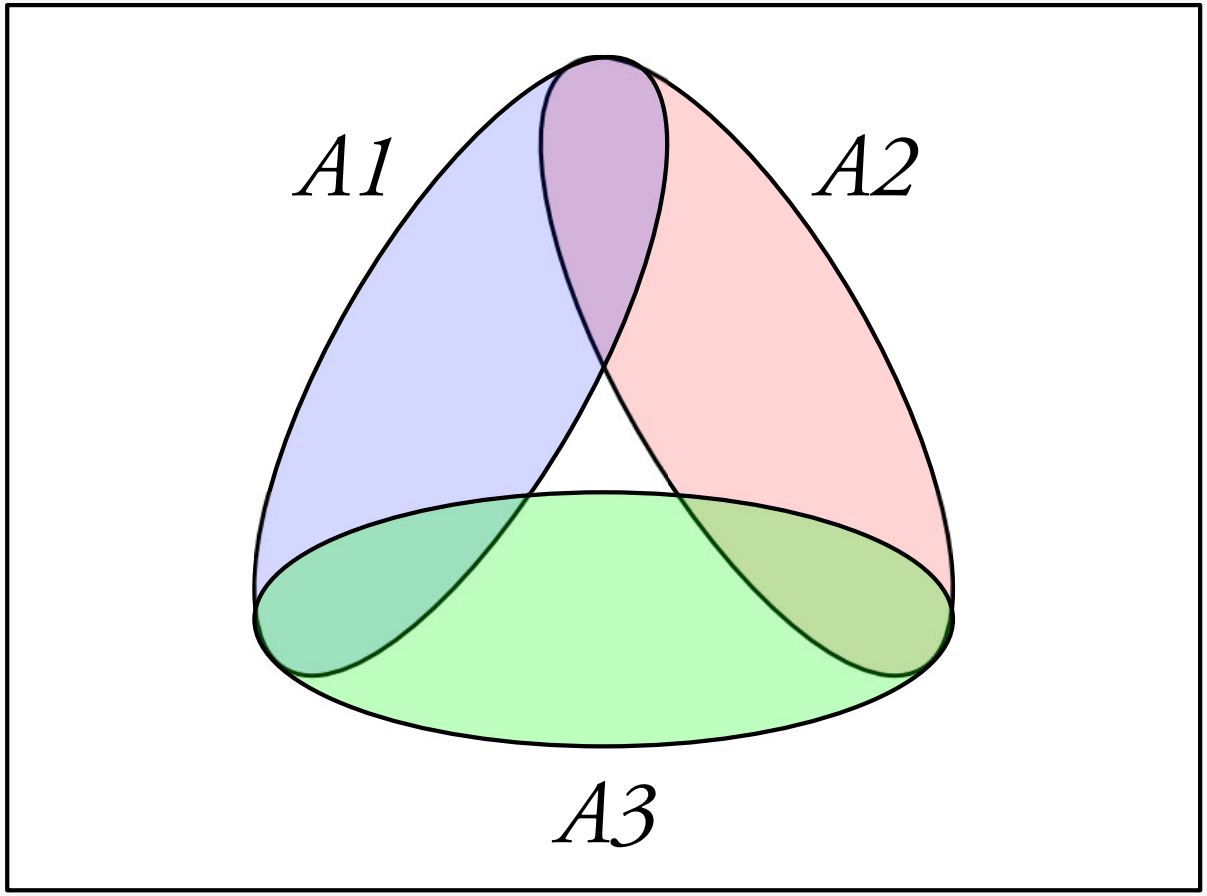

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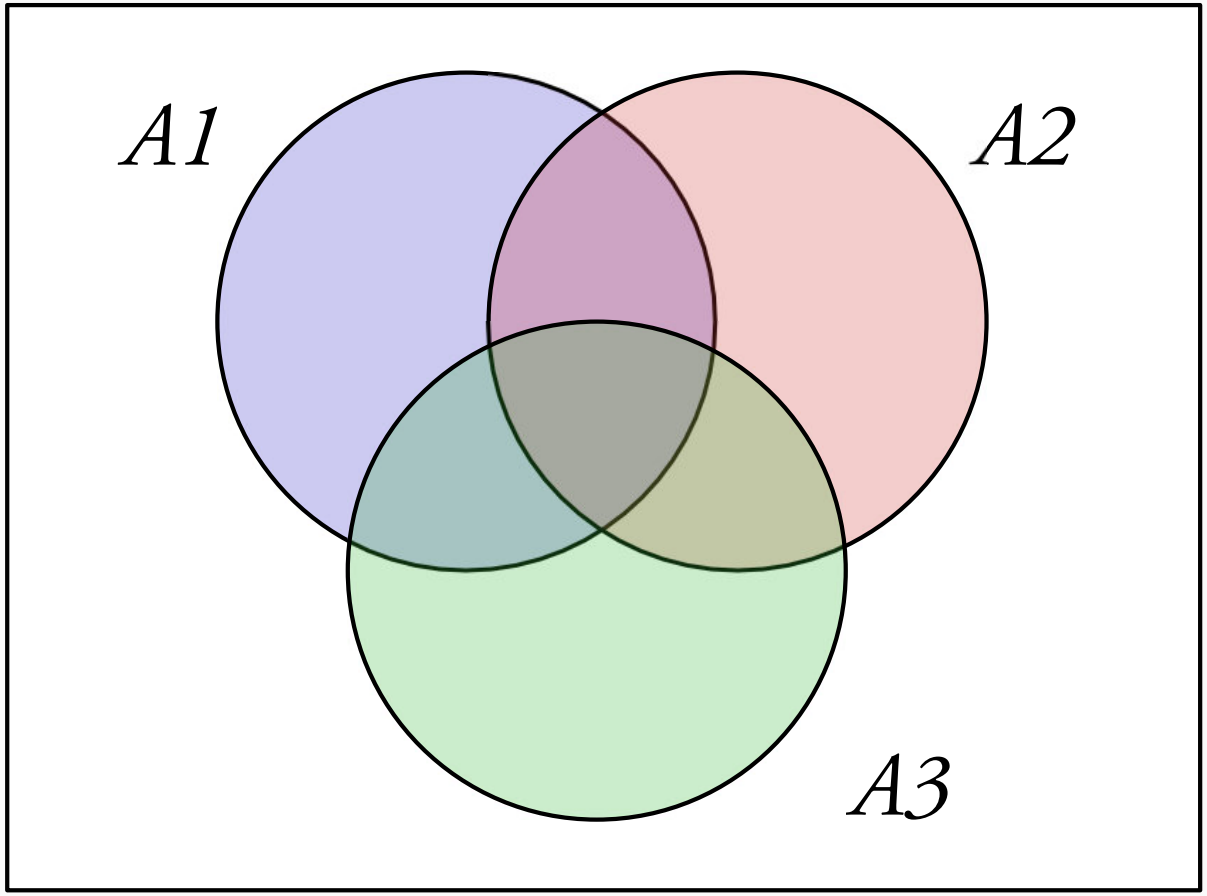

Outline

Validity and Joint Impossibility

Validity

An argument is valid if and only if it is impossible for its premises to all be true while its conclusion is simultaneously false.

- *P1*, *P2* ∴ *C* is valid iff it is impossible for '*P1*' and '*P2*' to both be true while '*C*' is false.

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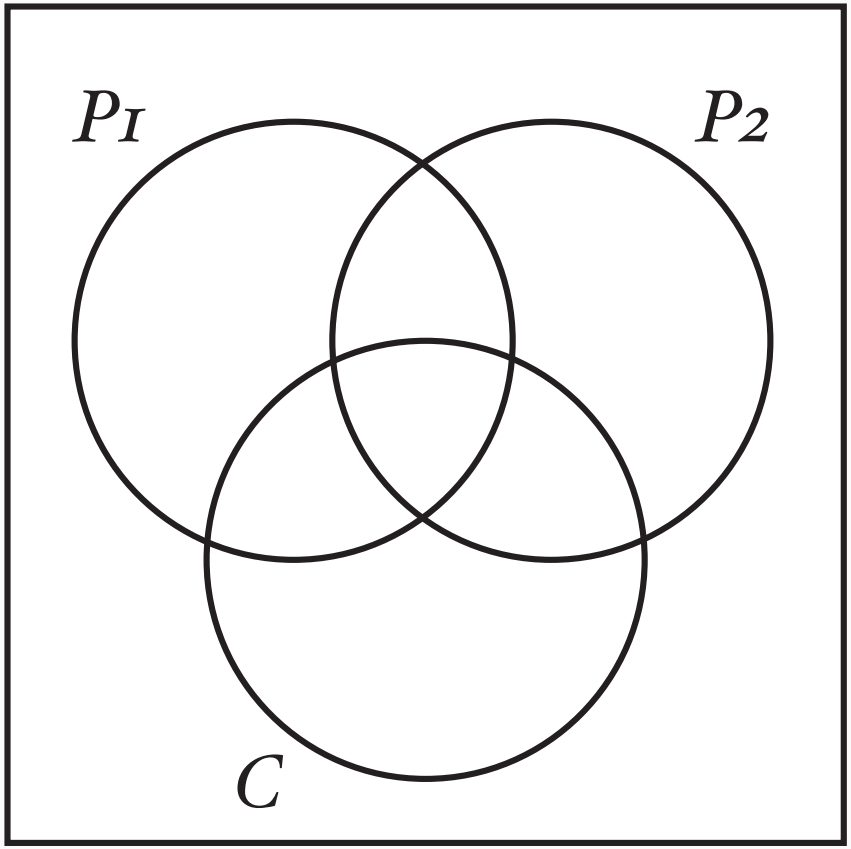

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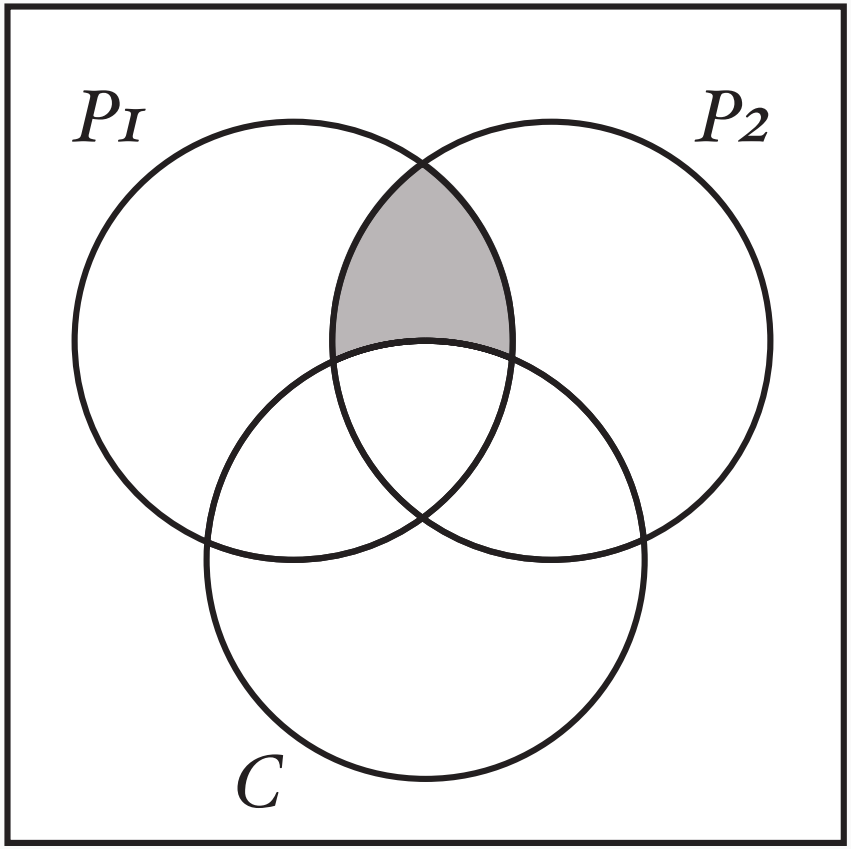

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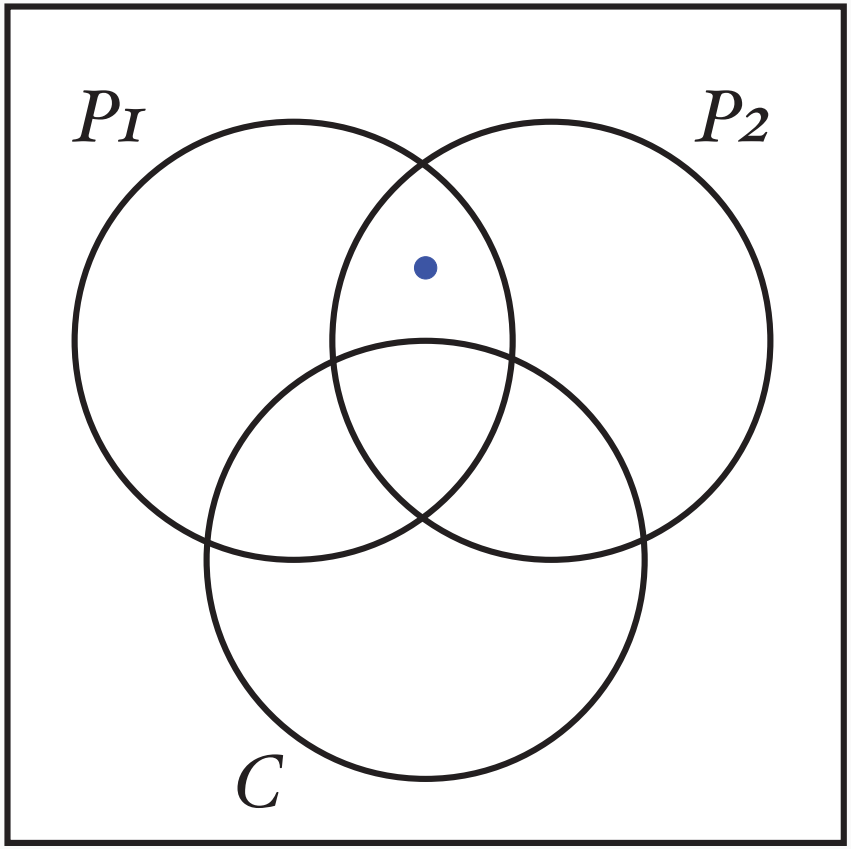

‘It is not the case that…’

- ‘$\mathscr{A}$’ is false iff ‘It is not the case that $\mathscr{A}$’ is true

‘It is not the case that…’

- ‘$\mathscr{A}$’ is false iff ‘It is not the case that $\mathscr{A}$’ is true
  - ‘I ate my keys’ is false iff ‘It is not the case that I ate my keys’ is true

‘It is not the case that…’

- ‘$\mathscr{A}$’ is false iff ‘It is not the case that $\mathscr{A}$’ is true
  - ‘I ate my keys’ is false iff ‘It is not the case that I ate my keys’ is true
  - ‘It’s raining’ is false iff ‘It’s not raining’ is true

‘It is not the case that…’

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  - ‘I ate my keys’ is false iff ‘It is not the case that I ate my keys’ is true
  - ‘It’s raining’ is false iff ‘It’s not raining’ is true
  - ‘Ice cream sundaes are the best’ is false iff ‘Ice cream sundaes are not the best’ is true

Validity and Joint Impossibility

Validity

An argument is valid if and only if it is impossible for its premises to all be true while its conclusion is simultaneously false.

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- *P1*, *P2* ∴ *C* is valid iff it is impossible for '*P1*' and '*P2*' to both be true while 'not-*C*' is true.

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An argument is valid if and only if it is impossible for its premises to all be true while its conclusion is simultaneously false.

- *P1*, *P2* ∴ *C* is valid iff it is impossible for '*P1*', '*P2*', and 'not-*C*' to all be true.
- *P1*, *P2* ∴ *C* is valid iff '*P1*', '*P2*', and 'not-*C*' are jointly impossible.

Validity and Joint Impossibility

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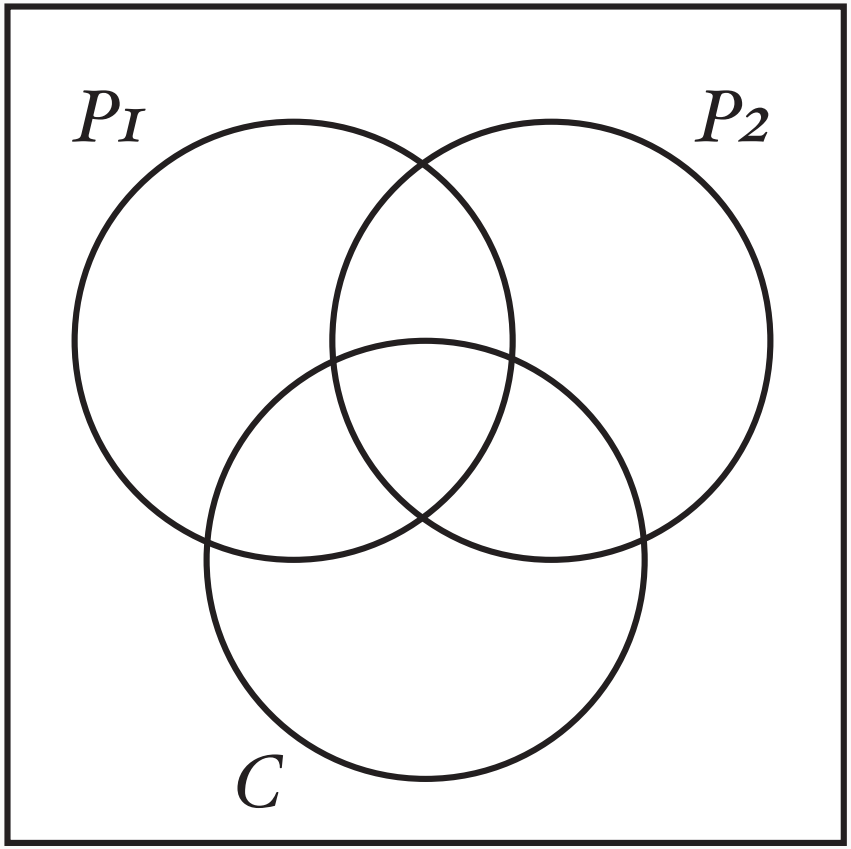
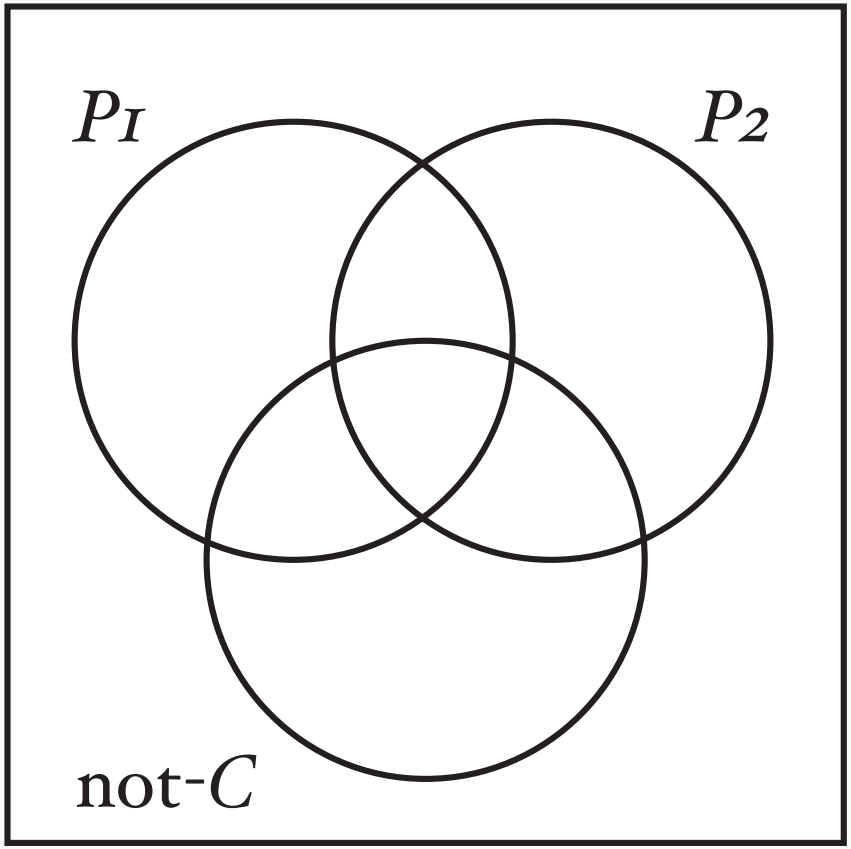
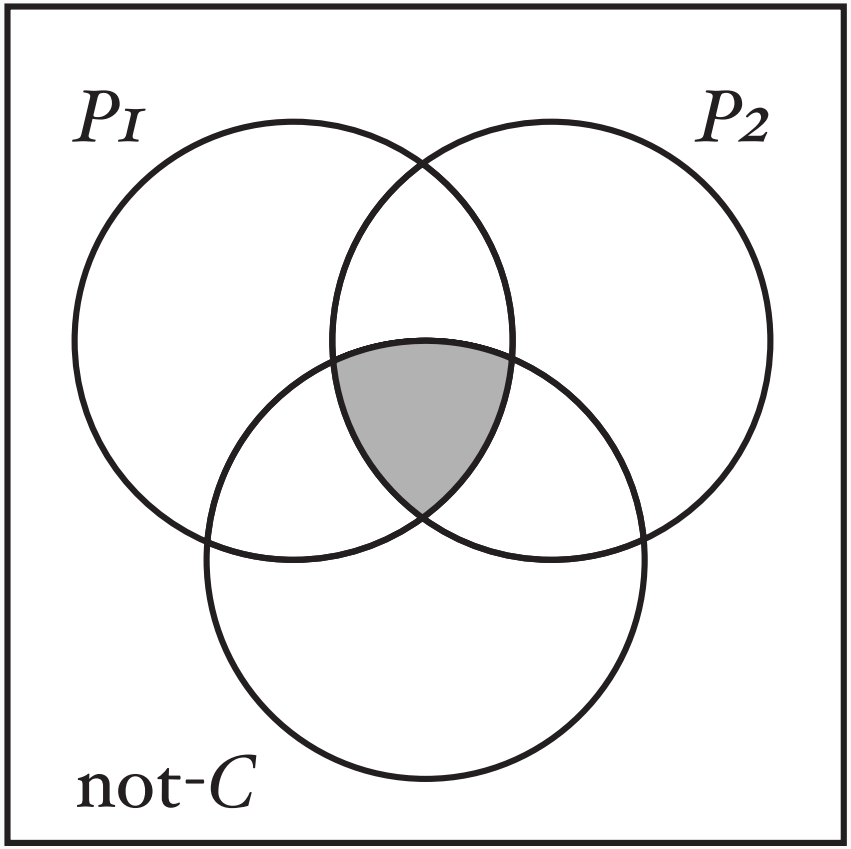
Validity and Joint Impossibility



Validity and Joint Impossibility



Validity and Joint Impossibility



Special Cases of Validity

- If not-*C* is impossible, then *P1*, *P2*, and not-*C* are jointly impossible.

Special Cases of Validity

- If not-*C* is impossible, then *P1*, *P2*, and not-*C* are jointly impossible.
- If *P1* and *P2* are jointly impossible, then *P1*, *P2*, and not-*C* are jointly impossible.

Validity and Joint Impossibility

$$
\begin{aligned}
&P1\\
&P2\\
&P3\\
\therefore\ &C
\end{aligned}
$$

The argument is valid—if you accept *P1*, *P2*, and *P3*, you must accept *C*—so accept *C*

Validity and Joint Impossibility

$P1$, $P2$, $P3$, not-C

These are jointly impossible—we must reject one of them—so reject 'not-C'

Outline

Necessary Truth

- Either Trump will win in 2020 or Trump will not win in 2020

Necessary Truth

- Either Trump will win in 2020 or Trump will not win in 2020
- If it snows here tomorrow, then it precipitates here tomorrow

Necessary Truth

- Either Trump will win in 2020 or Trump will not win in 2020
- If it snows here tomorrow, then it precipitates here tomorrow
- I'm not taller than myself

Necessary Truth

Necessary Truth

A statement is a *necessary truth* iff it is impossible for that statement to be false.

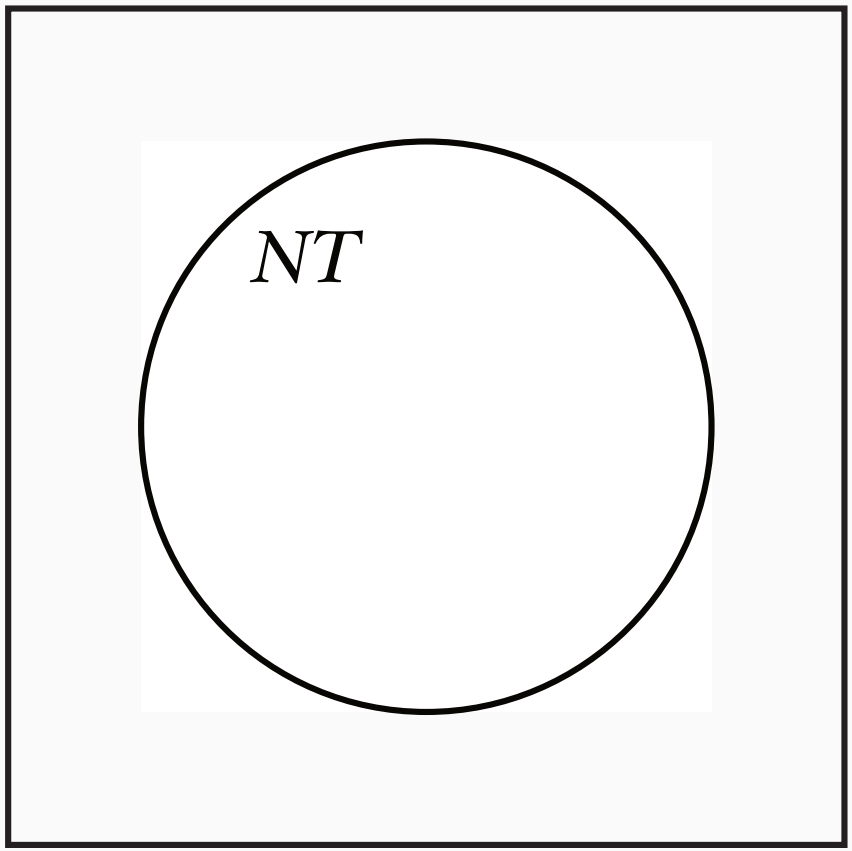
Necessary Truth

Necessary Truth

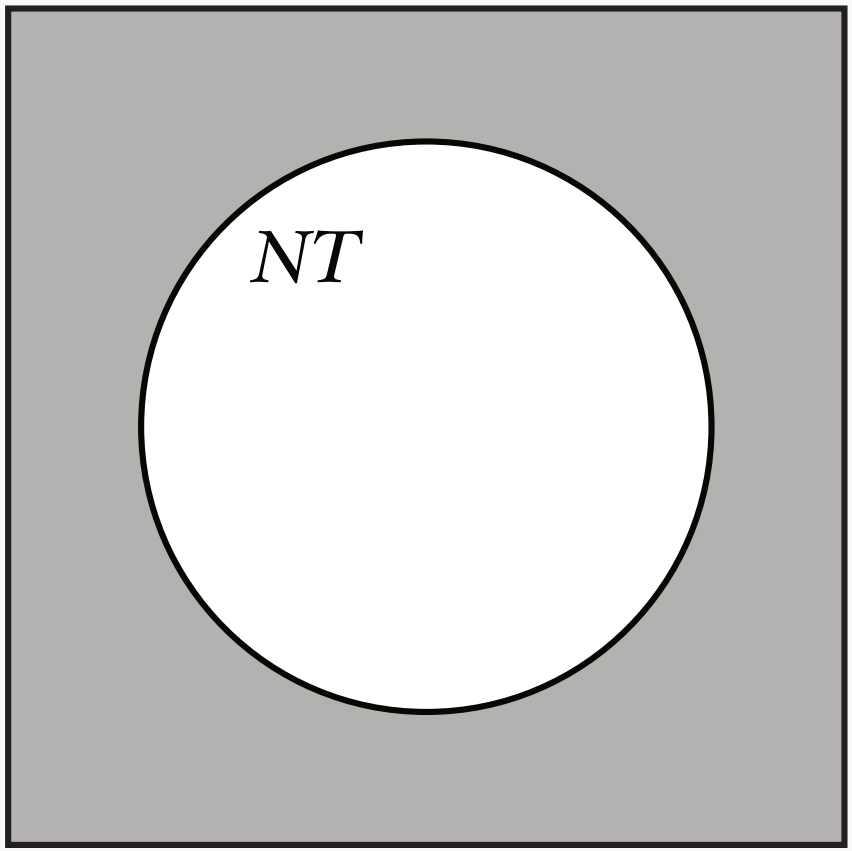
A statement is a *necessary truth* iff it is impossible for that statement to be false.

A statement is a *necessary truth* iff it is necessarily true

Necessary Truth



Necessary Truth



Necessary Falsehood

- Trump will win in 2020 and he will not win in 2020

Necessary Falsehood

- Trump will win in 2020 and he will not win in 2020
- It will snow here tomorrow, but it won't precipitate here tomorrow

Necessary Falsehood

- Trump will win in 2020 and he will not win in 2020
- It will snow here tomorrow, but it won't precipitate here tomorrow
- I am taller than myself.

Necessary Falsehood

Necessary Falsehood

A statement is a *necessary falsehood* iff it is impossible for that statement to be true.

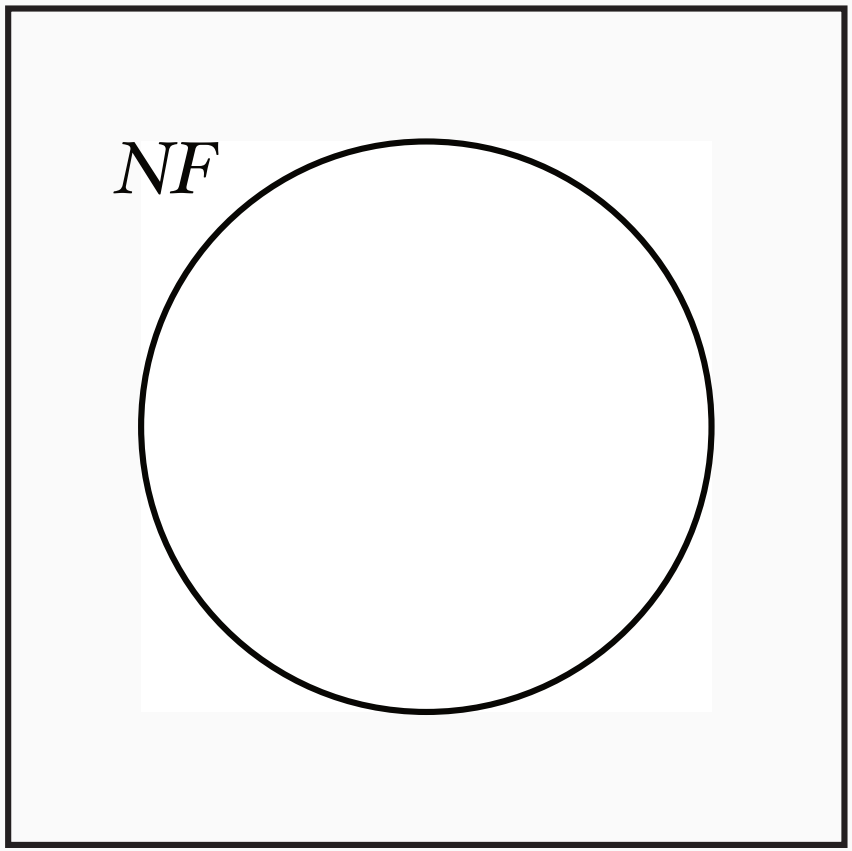
Necessary Falsehood

Necessary Falsehood

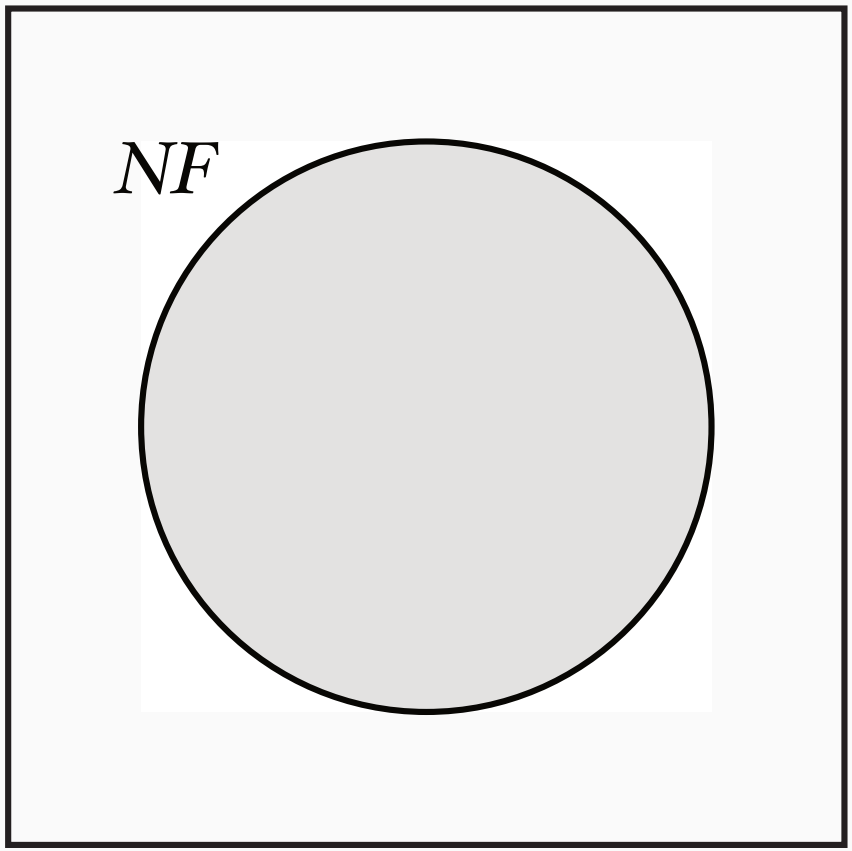
A statement is a *necessary falsehood* iff it is impossible for that statement to be true.

A statement is a *necessary falsehood* iff it is necessarily false

Necessary Falsehood



Necessary Falsehood



Contingencies

- Trump will win in 2020

Contingencies

- Trump will win in 2020
- It will snow here tomorrow

Contingencies

- Trump will win in 2020
- It will snow here tomorrow
- I am taller than Travis

Necessary Falsehood

Contingencies

A statement is a *contingency* iff it is possible for it to be true and it is possible for it to be false.

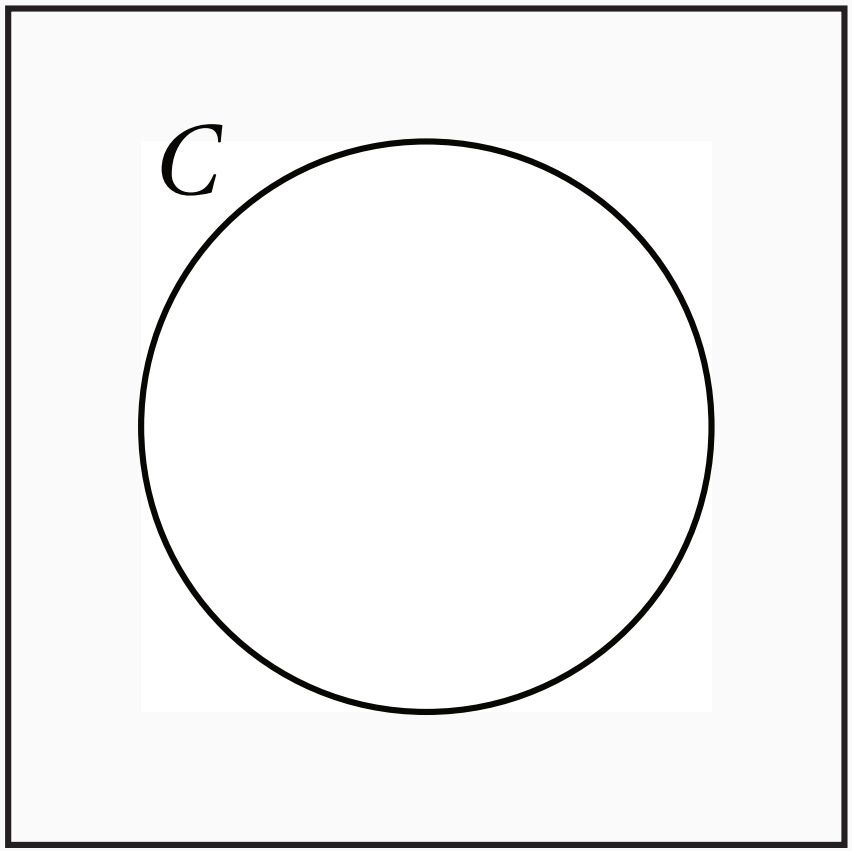
Necessary Falsehood

Contingencies

A statement is a *contingency* iff it is possible for it to be true and it is possible for it to be false.

A statement is a *contingency* iff it is neither necessarily true nor necessarily false

Contingency



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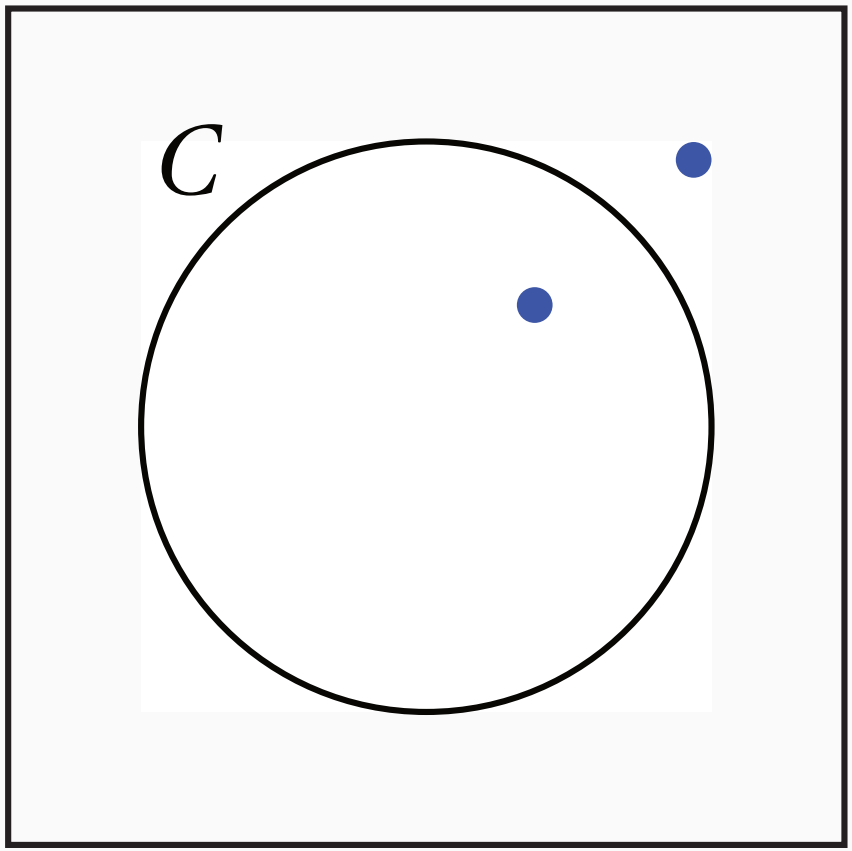

Validity

Necessary Falsehood

Necessary Truth

$\therefore$ Necessary Falsehood

Validity

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Valid

Validity

Contingency

Necessary Truth

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Invalid

Validity

Contingency

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$\therefore$ Contingency

Validity

Contingency

Contingency

$\therefore$ Contingency

Not enough information to say whether it's valid

Validity

Contingency

Contingency

$\therefore$ Necessary Falsehood

Validity

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Not enough information to say whether it's valid