Arguments and Validity

PHIL 500

August 28, 2019

Outline

Arguments

Validity

Outline

Arguments

Validity

Arguments

- An *argument* is a collection of reasons for believing some claim.

Arguments

- An *argument* is a collection of reasons for believing some claim.
- We typically use arguments to *persuade* one another.

Arguments

- An *argument* is a collection of reasons for believing some claim.
- We typically use arguments to *persuade* one another.
- The thing that the argument is arguing *for* is called the *conclusion* of the argument.

Arguments

- An *argument* is a collection of reasons for believing some claim.
- We typically use arguments to *persuade* one another.
- The thing that the argument is arguing *for* is called the *conclusion* of the argument.
- The reasons which are presented in the conclusion's favor are called the *premises* of the argument.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

  Bacon isn't meat.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

  Bacon isn't meat.

  Samuel Huntington is spry.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

  Bacon isn't meat.

  Samuel Huntington is spry.

  Summer will never come.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

  Bacon isn't meat.
  Samuel Huntington is spry.
  Summer will never come.
  $\therefore$ So, Elmer Fudd isn't fictional.

Arguments

- An argument $\stackrel{\text{def}}{=}$ a collection of statements, at most one of which is designated as the *conclusion*, the others of which are designated as the *premises*.
- So, this will count as an argument:

  Bacon isn't meat.

  Samuel Huntington is spry.

  Summer will never come.

  $\therefore$ So, Elmer Fudd isn't fictional.

Statements

- A *statement* is a sentence which is capable of being true or false.

Statements

- A *statement* is a sentence which is capable of being true or false.
- ▹ I ate my car keys

Statements

- A *statement* is a sentence which is capable of being true or false.

▹ I ate my car keys ✓

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’ ×

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’ ×
  - ‘Who ate the car keys?’

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’ ×
  - ‘Who ate the car keys?’ ×

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’ ×
  - ‘Who ate the car keys?’ ×
  - ‘Ouch!’

Statements

- A *statement* is a sentence which is capable of being true or false.
  - I ate my car keys ✓
  - ‘Nobody knows the trouble I’ve seen’ ✓
  - ‘Chocolate is tasty’ ✓
  - ‘Try jiggling the handle’ ×
  - ‘Who ate the car keys?’ ×
  - ‘Ouch!’ ×

Statements

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓
- ‘It is true that try jiggling the handle’

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓
- ‘It is true that try jiggling the handle’ ×

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓
- ‘It is true that try jiggling the handle’ ×
- ‘It is true that nobody knows the trouble I’ve seen’

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓
- ‘It is true that try jiggling the handle’ ×
- ‘It is true that nobody knows the trouble I’ve seen’ ✓

Statements

A Test

Given some sentence, '$\mathscr{A}$', if 'It is true that $\mathscr{A}$' makes sense, then '$\mathscr{A}$' is a statement. If 'It is true that $\mathscr{A}$' does not make sense, then '$\mathscr{A}$' is not a statement.

- 'It is true that I ate my car keys' ✓
- 'It is true that try jiggling the handle' ×
- 'It is true that nobody knows the trouble I've seen' ✓
- 'It is true that who ate the car keys?'

Statements

A Test

Given some sentence, ‘$\mathscr{A}$’, if ‘It is true that $\mathscr{A}$’ makes sense, then ‘$\mathscr{A}$’ is a statement. If ‘It is true that $\mathscr{A}$’ does not make sense, then ‘$\mathscr{A}$’ is not a statement.

- ‘It is true that I ate my car keys’ ✓
- ‘It is true that try jiggling the handle’ ×
- ‘It is true that nobody knows the trouble I’ve seen’ ✓
- ‘It is true that who ate the car keys?’ ×

Statements

A Test

Given some sentence, '$\mathscr{A}$', if 'It is true that $\mathscr{A}$' makes sense, then '$\mathscr{A}$' is a statement. If 'It is true that $\mathscr{A}$' does not make sense, then '$\mathscr{A}$' is not a statement.

- 'It is true that I ate my car keys' ✓
- 'It is true that try jiggling the handle' ×
- 'It is true that nobody knows the trouble I've seen' ✓
- 'It is true that who ate the car keys?' ×
- 'It is true that chocolate is tasty'

Statements

A Test

Given some sentence, '$\mathscr{A}$', if 'It is true that $\mathscr{A}$' makes sense, then '$\mathscr{A}$' is a statement. If 'It is true that $\mathscr{A}$' does not make sense, then '$\mathscr{A}$' is not a statement.

- 'It is true that I ate my car keys' ✓
- 'It is true that try jiggling the handle' ×
- 'It is true that nobody knows the trouble I've seen' ✓
- 'It is true that who ate the car keys?' ×
- 'It is true that chocolate is tasty' ✓

Statements

A Test

Given some sentence, '$\mathscr{A}$', if 'It is true that $\mathscr{A}$' makes sense, then '$\mathscr{A}$' is a statement. If 'It is true that $\mathscr{A}$' does not make sense, then '$\mathscr{A}$' is not a statement.

- 'It is true that I ate my car keys' ✓
- 'It is true that try jiggling the handle' ×
- 'It is true that nobody knows the trouble I've seen' ✓
- 'It is true that who ate the car keys?' ×
- 'It is true that chocolate is tasty' ✓
- 'It is true that ouch!'

Statements

A Test

Given some sentence, '$\mathscr{A}$', if 'It is true that $\mathscr{A}$' makes sense, then '$\mathscr{A}$' is a statement. If 'It is true that $\mathscr{A}$' does not make sense, then '$\mathscr{A}$' is not a statement.

- 'It is true that I ate my car keys' ✓
- 'It is true that try jiggling the handle' ×
- 'It is true that nobody knows the trouble I've seen' ✓
- 'It is true that who ate the car keys?' ×
- 'It is true that chocolate is tasty' ✓
- 'It is true that ouch!' ×

Arguments

An argument $\stackrel{\text{def}}{=}$ a collection of statements, one of which is designated as the *conclusion*, the others of which are designated as the *premises*.

Arguments

Arguments

Somewhere over the rainbow

$\therefore$ Nobody knows the trouble I've seen

Arguments

Somewhere over the rainbow

∴ Nobody knows the trouble I've seen

Arguments

Chocolate is tasty

The Lady in the Water is a terrible movie

∴ *The Lady in the Water* is a terrible, terrible movie

Arguments

Chocolate is tasty

The Lady in the Water is a terrible movie

$\therefore$ *The Lady in the Water* is a terrible, terrible movie

Arguments

If it's raining, then you need an umbrella

It's raining

$\therefore$ You need an umbrella

Arguments

If it's raining, then you need an umbrella

It's raining

$\therefore$ You need an umbrella

Arguments

If it's raining, bring an umbrella

It's raining

$\therefore$ Bring an umbrella

Arguments

If it's raining, bring an umbrella

It's raining

$\therefore$ Bring an umbrella

Outline

Arguments

Validity

Validity

- One important way for an argument to be *good*: the truth of all of its premises guarantees the truth of its conclusion.

Validity

- One important way for an argument to be *good*: the truth of all of its premises guarantees the truth of its conclusion.
- If all of the argument's premises are true, then its conclusion must be true as well.

Validity

- One important way for an argument to be *good*: the truth of all of its premises guarantees the truth of its conclusion.
- If all of the argument's premises are true, then its conclusion must be true as well.

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.

Validity

- One important way for an argument to be *good*: the truth of all of its premises guarantees the truth of its conclusion.
- If all of the argument's premises are true, then its conclusion must be true as well.

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.

Invalidity

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

Validity

- One important way for an argument to be *good*: the truth of all of its premises guarantees the truth of its conclusion.
- If all of the argument's premises are true, then its conclusion must be true as well.

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.

Invalidity

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

Validity

Gerald is either in Barcelona or in New York

Gerald is not in New York

$\therefore$ Gerald is in Barcelona

Validity

Gerald is either in Barcelona or in New York

Gerald is not in New York

$\therefore$ Gerald is in Barcelona

Validity

Sabeen is younger than 30

$\therefore$ Sabeen is younger than 40

Validity

Sabeen is younger than 30

$\therefore$ Sabeen is younger than 40

Validity

- Valid arguments can have false premises

Validity

- *Valid arguments can have false premises*

Validity

- *Valid arguments can have false premises*

Validity

- *Valid arguments can have false premises*
- Valid arguments can have false conclusions

Validity

- *Valid arguments can have false premises*
- *Valid arguments can have false conclusions*

Validity

- *Valid arguments can have false premises*
- *Valid arguments can have false conclusions*

Validity

- *Valid arguments can have false premises*
- *Valid arguments can have false conclusions*
- If the truth of the premises is enough to guarantee the truth of the conclusion, then the argument is valid, *whether or not the premises actually are true*

Validity

- *Valid arguments can have false premises*
- *Valid arguments can have false conclusions*
- If the truth of the premises is enough to guarantee the truth of the conclusion, then the argument is valid, *whether or not the premises actually are true*
- If all of the premises of a valid argument are all true, then we say that the argument is *sound*

Soundness

Soundness

An argument is sound if and only if it is valid and it has all true premises.

Soundness

Soundness

An argument is sound if and only if it is valid and it has all true premises.

Soundness

Soundness

An argument is sound if and only if it is valid and it has all true premises.

Validity

- Not every good and persuasive argument is *valid*.

Validity

- Not every good and persuasive argument is *valid*.
- Consider, for instance,

Validity

- Not every good and persuasive argument is *valid*.
- Consider, for instance,

> Every morning of my life up to today, the sun has risen in the east

Validity

- Not every good and persuasive argument is *valid*.
- Consider, for instance,

  Every morning of my life up to today, the sun has risen in the east

  ∴ Tomorrow, the sun will rise in the east.

Validity

- Not every good and persuasive argument is *valid*.
- Consider, for instance,

  Every morning of my life up to today, the sun has risen in the east

  ∴ Tomorrow, the sun will rise in the east.

- Is this argument deductively valid?

Validity

- Not every good and persuasive argument is *valid*.
- Consider, for instance,

  Every morning of my life up to today, the sun has risen in the east

  ∴ Tomorrow, the sun will rise in the east.

- Is this argument deductively valid?
- No, but it is still *very* persuasive. It's still a *very* good argument.

Validity and Invalidity

Validity

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

Invalidity

An argument is invalid if and only if it is possible for all of its premises to be true while its conclusion is simultaneously false.

Validity and Invalidity

Saudia Arabia is a large island in the Atlantic ocean

$\therefore$ Saudia Arabia is an island in the Atlantic ocean

Validity and Invalidity

Saudia Arabia is a large island in the Atlantic ocean

$\therefore$ Saudia Arabia is an island in the Atlantic ocean

Validity and Invalidity

Susan has a cat

$\therefore$ Susan has a black cat

Validity and Invalidity

Susan has a cat

$\therefore$ Susan has a black cat

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.

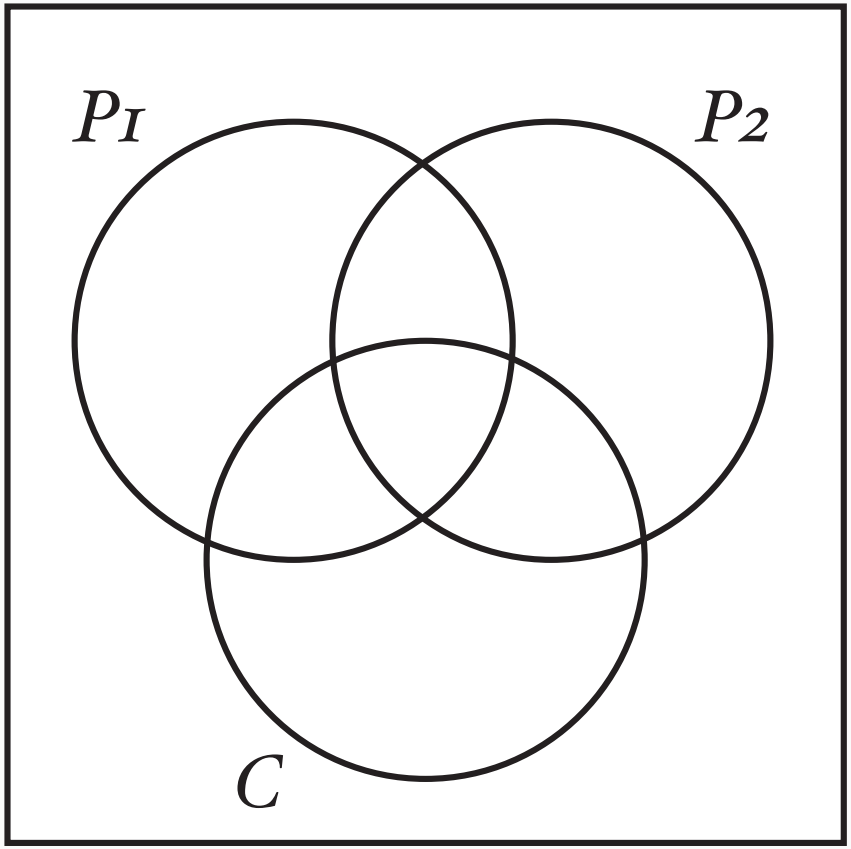
Validity and Invalidity

P1

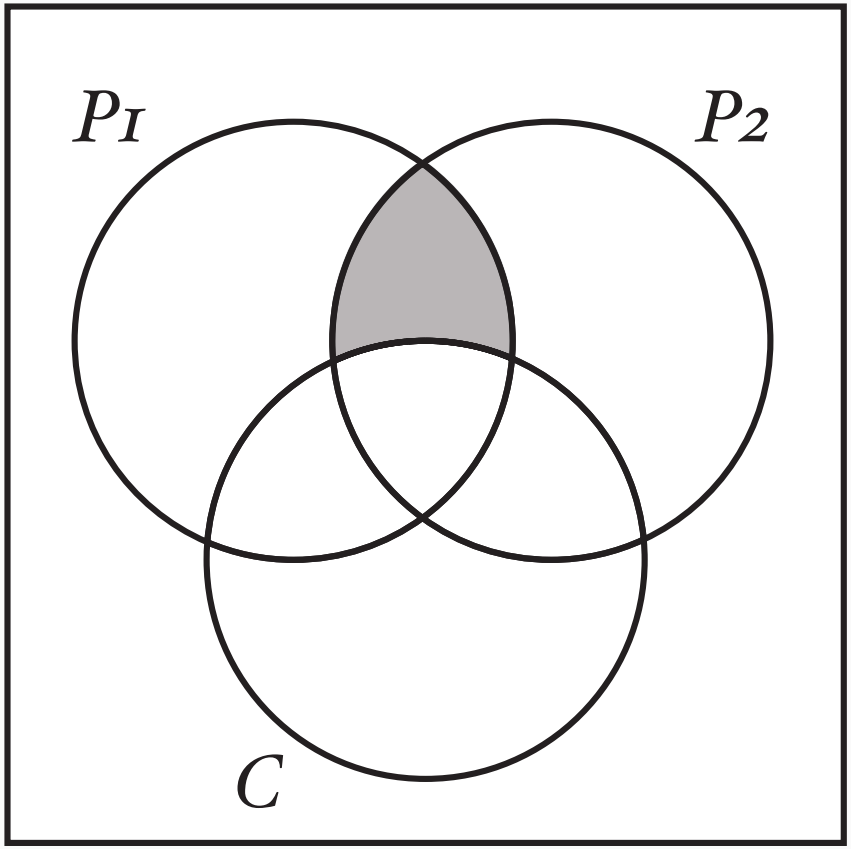
P2

$\therefore$ C

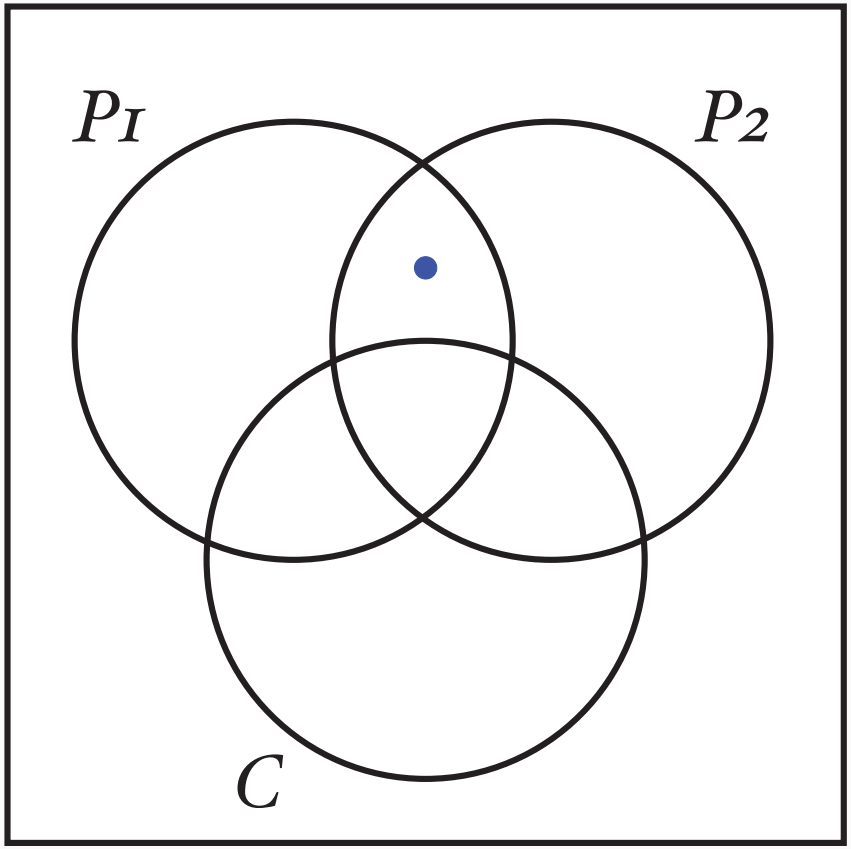
Validity and Invalidity



Validity



Invalidity



Validity and Invalidity

The UK is going to exit the EU without a deal

$\therefore$ Either the UK is going to exit the EU without a deal or Boston is the capital of the USA

Validity and Invalidity

The UK is going to exit the EU without a deal

$\therefore$ Either the UK is going to exit the EU without a deal or Boston is the capital of the USA

Validity and Invalidity

Either the UK will No Deal or I'll eat my hat

$\therefore$ The UK will No Deal

Validity and Invalidity

Either the UK will No Deal or I'll eat my hat

$\therefore$ The UK will No Deal

Validity and Invalidity

It is raining.

It is not raining.

$\therefore$ So, chocolate falls from the sky every Thursday.

Validity and Invalidity

It is raining

It is not raining

$\therefore$ So, chocolate falls from the sky every Thursday

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 is impossible for an argument's premises to all be true, then it is impossible for all of the argument's premises to be true while its conclusion is false.

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 is impossible for an argument's premises to all be true, then it is impossible for all of the argument's premises to be true while its conclusion is false.

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 is impossible for an argument's premises to all be true, then it is impossible for all of the argument's premises to be true while its conclusion is false.

Validity and Invalidity

Colonel Mustard didn't do it in the Library

$\therefore$ Colonel Mustard didn't do it in the Library with the lead pipe

Validity and Invalidity

Colonel Mustard didn't do it in the Library

$\therefore$ Colonel Mustard didn't do it in the Library with the lead pipe

Validity and Invalidity

There's a mountain which is taller than itself

$\therefore$ Giant spiders roam the desert in search of a lost amulet

Validity and Invalidity

There's a mountain which is taller than itself

$\therefore$ Giant spiders roam the desert in search of a lost amulet

Validity and Invalidity

Barack Obama is a space alien

Sunday follows Friday

$\therefore$ If it's raining, then it's raining

Validity and Invalidity

Barack Obama is a space alien

Sunday follows Friday

$\therefore$ If it's raining, then it's raining

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 is impossible for an argument's conclusion to be false, then it is impossible for all of the argument's premises to be true while its conclusion is false.

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 is impossible for an argument's conclusion to be false, then it is impossible for all of the argument's premises to be true while its conclusion is false.

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 is impossible for an argument's conclusion to be false, then it is impossible for all of the argument's premises to be true while its conclusion is false.

Validity and Invalidity

If the UK will leave the EU without a deal, then there will be drug shortages

The UK will leave the EU without a deal

$\therefore$ There will be drug shortages

Validity and Invalidity

If the UK will leave the EU without a deal, then there will be drug shortages

The UK will leave the EU without a deal

$\therefore$ There will be drug shortages

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

$\therefore$ Sam is 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

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

$\therefore$ Chocolate is tasty

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

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