Introduction to Logical Reasoning

Validity and Table Tables

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Arguments

Recall that an **argument** is a collection of statements about which the claim is made that the truth of all the premises entails the truth of the conclusion.

So an argument asserts that the conclusion can be inferred from the premises. That is, the claim is that *if* the premises, then the conclusion *must* be true as well.

Valid and Invalid Arguments

Also recall the distinction between deductively valid arguments and deductively invalid arguments:

> A **valid** argument is an argument where the truth of all its premises logically entails the truth of its conclusion.
>
> An **invalid** argument is an argument where it *is* logically possible for the conclusion to be false while the premises are all true.

Argument 1

Consider the following argument:

> George W. Bush was winning the war on terror. This is because while he was President there were no successful terrorist attacks on American soil after 9/11. For if Bush was winning the war on terror, then there would be no successful terrorist attacks on American soil after 9/11.

Assessing Validity

Step 1: Put the argument into argumentative form:

1. While George W. Bush was President there were no successful terrorist attacks on American soil after 9/11.

2. If George W. Bush was winning the war on terror, then there would be no successful terrorist attacks on American soil after 9/11.

∴ George W. Bush was winning the war on terror.

Assessing Validity

Step 2: Label each simple positive statement that the argument involves.

Here there are two of such statements to label:

1. While George W. Bush was President there were successful **terrorist** attacks on American soil after 9/11. (T)

2. Bush was **winning** the war on terror. (W)

Assessing Validity

Step 3: Translate the entire argument into the language of symbolic logic.

Here we have:

1. $\sim T.$
2. $W \rightarrow \sim T.$

$\therefore W.$

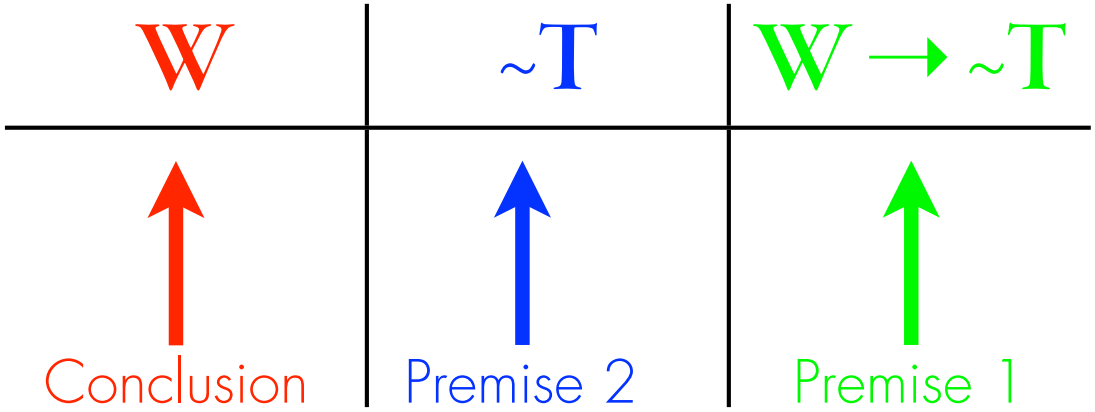
Assessing Validity

Step 4: Construct a truth table.

Each premise and the conclusion must have its own column in the truth table.

Assessing Validity

Begin by putting each premise and the conclusion at the top of a column.



Put negative and compound statements (i.e., more than one letter/symbol) to the right. Put simple positive statements (only one letter) to the far left.

Assessing Validity

Then add any additional columns, following the procedure for truth table construction.

T	W	~T	W → ~T

Conclusion Premise 2 Premise 1

Assessing Validity

Fill in the rows, following the procedure for truth table construction.

T	W	~T	W → ~T
T	T	F	F
T	F	F	T
F	T	T	T
F	F	T	T
	Conclusion	Premise 2	Premise 1

Assessing Validity

Step 5: Circle any rows in which *all* the premises are true.

T	W	~T	W → ~T
T	T	F	F
T	F	F	T
F	T	T	T
F	F	T	T

Conclusion Premise 2 Premise 1

Assessing Validity

Step 6: The argument is valid just when the conclusion is true in *all* the circled rows.

T	W	~T	W → ~T
T	T	F	F
T	F	F	T
F	T	T	T
F	F	T	T

Conclusion Premise 2 Premise 1

Assessing Validity

In this case, the conclusion is false in one row, so this argument is *invalid*.

T	W	~T	W → ~T
T	T	F	F
T	F	F	T
F	T	T	T
F	F	T	T

Conclusion Premise 2 Premise 1

Bad!

Argument 1

Is this a valid argument?

> George W. Bush was winning the war on terror. This is because while he was President there were no successful terrorist attacks on American soil after 9/11. For if Bush was winning the war on terror, then there would be no successful terrorist attacks on American soil after 9/11.

No, this is an invalid argument. The premises may both be true, but the conclusion may still be false.

Argument 2

Consider the following argument:

> If the United States gives humanitarian aid to Middle Eastern countries, then the United States will win the war on terror. The United States gives humanitarian aid to Middle Eastern countries. Therefore, the United States will win the war on terror.

Assessing Validity

Step 1: Put the argument into argumentative form:

1. If the United States gives humanitarian aid to Middle Eastern countries, then the United States will win the war on terror.

2. The United States gives humanitarian aid to Middle Eastern countries.

∴ The United States will win the war on terror.

Assessing Validity

Step 2: Label each simple positive statement that the argument involves.

Here there are two of such statements to label:

1. The United States gives **humanitarian** aid to Middle Eastern countries (H)

2. The United States will **win** the war on terror. (W)

Assessing Validity

Step 3: Translate the entire argument into the language of symbolic logic.

Here we have:

1. $H \rightarrow W$.

2. H.

$\therefore$ W.

Assessing Validity

Step 4: Construct a truth table.

H	W	H → W
T	T	T
T	F	F
F	T	T
F	F	T
Premise 2	Conclusion	Premise 1

Assessing Validity

Step 5: Circle any rows in which *all* the premises are true.

H	W	H → W
T	T	T
T	F	F
F	T	T
F	F	T

Premise 2 Conclusion Premise 1

Assessing Validity

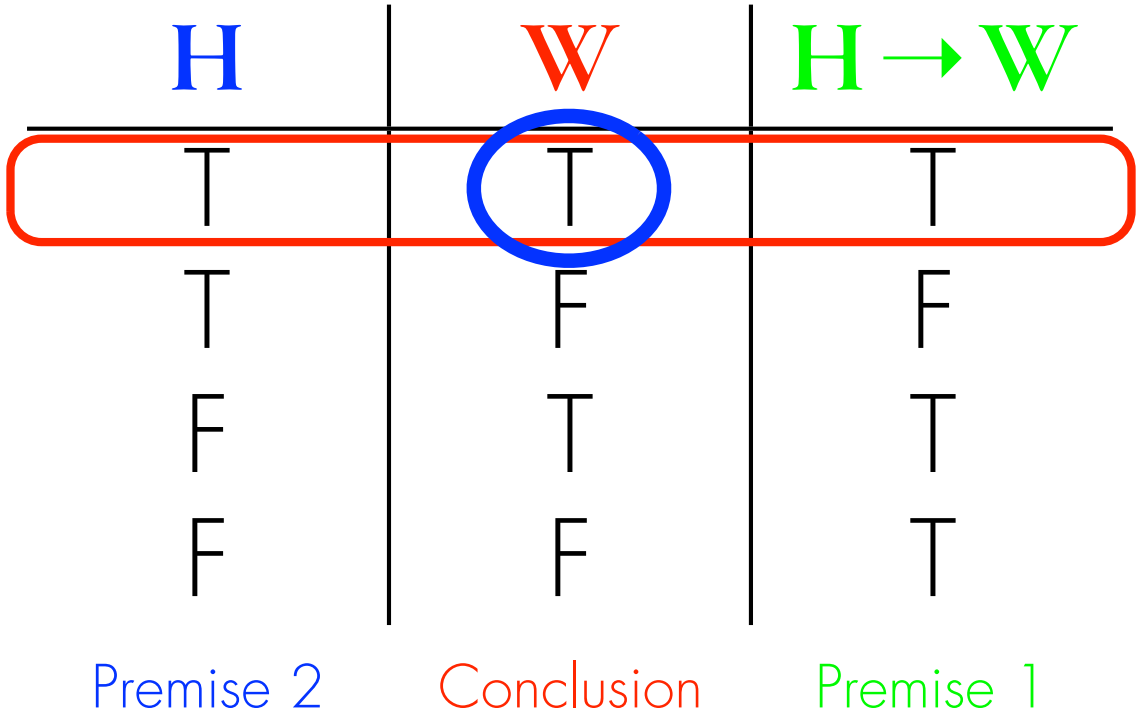
Step 6: The argument is valid just when the conclusion is true in *all* the circled rows.

H	W	H → W
T	T	T
T	F	F
F	T	T
F	F	T

Premise 2 Conclusion Premise 1

Assessing Validity

In this case the argument is *valid* because whenever the premises are all true, the conclusion is true as well.



Argument 2

Is this a valid argument?

> If the United States gives humanitarian aid to Middle Eastern countries, then the United States will win the war on terror. The United States gives humanitarian aid to Middle Eastern countries. Therefore, the United States will win the war on terror.

Yes, it is valid. (Soundness is another issue.)

Next Class...

We will look at some common valid and invalid forms that deductive arguments often take.