

HOW DO I TRANSLATE ENGLISH INTO (SENTENTIAL) LOGIC?

WEEK 1 . TOPIC INTRODUCTION

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sentences . connectives

If she's a politician then she's not telling the truth.

She is a politician.

∴ She's not telling the truth.

If he's a white supremacist then he's a racist.

He's a white supremacist.

∴ He's a racist.

If she's a politician **then** she's not telling the truth.

She is a politician.

∴ She's not telling the truth.

If he's a white supremacist **then** he's a racist.

He's a white supremacist.

∴ He's a racist.

If [she's a politician] then {she's not telling the truth.}

[She is a politician.]

∴ {She's not telling the truth.}

If [[he's a white supremacist]] then {{he's a racist.}}

[[He's a white supremacist.]]

∴ {{He's a racist.}}

If A then B.

A.

\therefore B.

Translation manual:

A is "She's a politician" and

B is "She's not telling the truth."

If C then D.

C.

\therefore D.

Translation manual:

C is "He's a white supremacist" and

D is "He's a racist."

If she's a politician then she's not telling the truth.

She is a politician.

∴ She's not telling the truth.

A.

Translation manual:

B.

A is "If she's a politician then she's not telling the truth. "

∴ C.

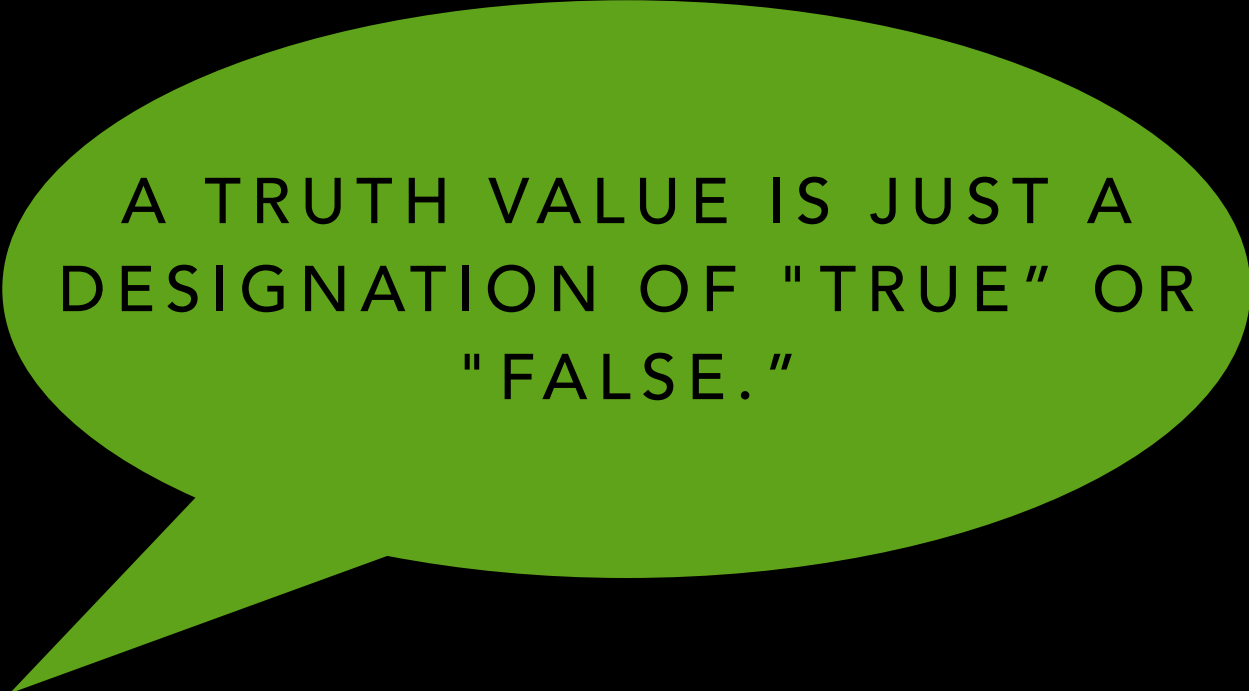
B is "She is a politician."

C is "She's not telling the truth."

SENTENCES ARE THE BASIC
UNITS OF OUR LOGICAL
ANALYSIS

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UNITS OF OUR LOGICAL
ANALYSIS AND MUST HAVE
TRUTH-VALUES.

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A TRUTH VALUE IS JUST A
DESIGNATION OF "TRUE" OR
"FALSE."

What's the truth value of:

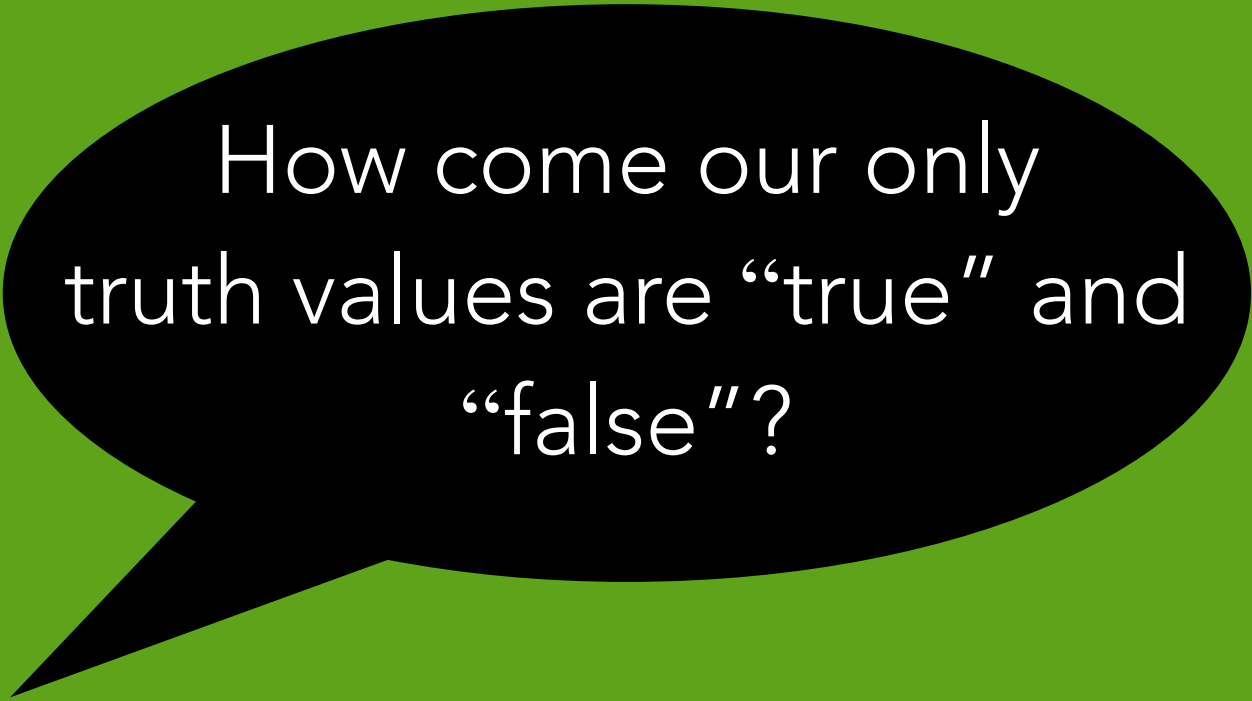
- $1+1=2$
- Biden is president of the US.
- Trump is president of the US.

[not a trick question!)

What's the truth value of:


- $1+1=2$ **true**
- Biden is president of the US. **true**
- Trump is president of the US. **false**

[not a trick question!)

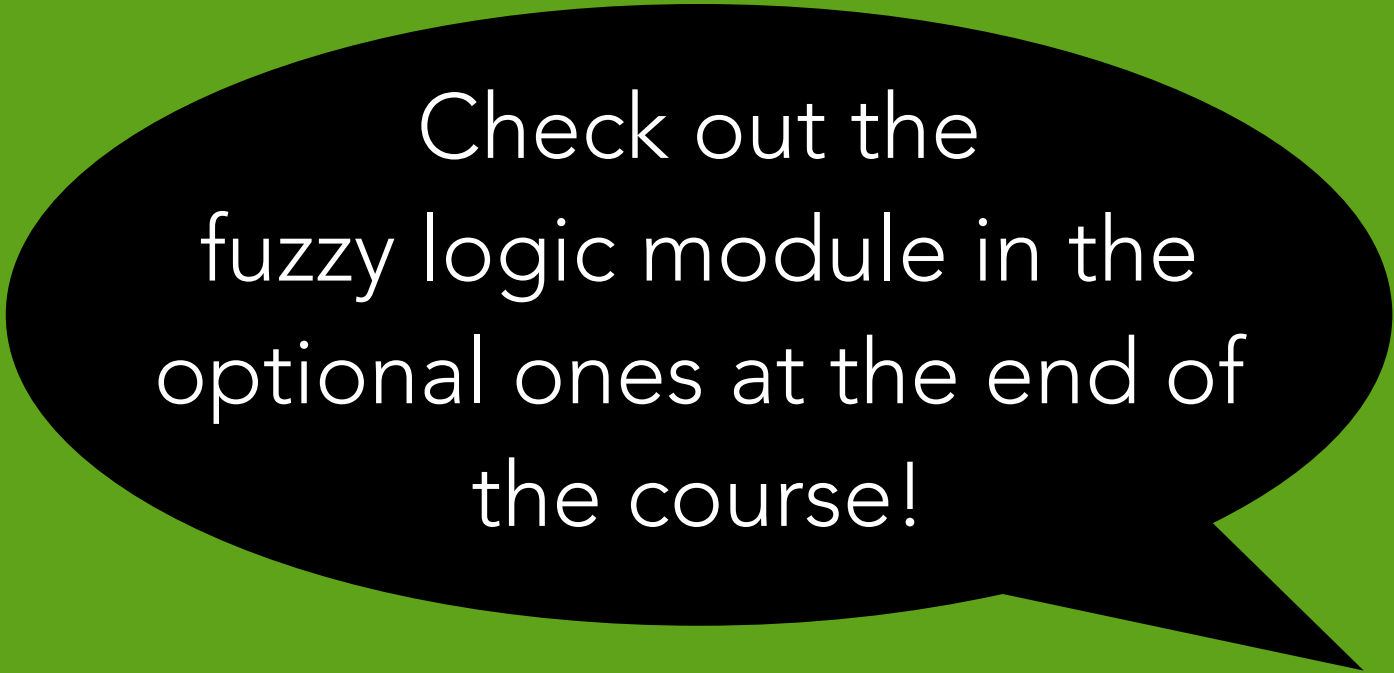


How come our only
truth values are “true” and
“false”?

In the meantime, consider that your rice cooker (if you
have one) might employ fuzzy logic!



How come our only truth values are “true” and “false”?



Check out the fuzzy logic module in the optional ones at the end of the course!

In the meantime, consider that your rice cooker (if you have one) might employ fuzzy logic!

sentences . connectives

If C then D.

C.

\therefore D.

Translation manual:

C is "He's a white supremacist" and

D is "He's a racist."

CONNECTIVES ARE OPERATORS
WHICH COMBINE ONE OR MORE
SENTENCES TO GENERATE
COMPLEX SENTENCES.

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THERE ARE 5: \wedge , \vee , \rightarrow , \leftrightarrow , \sim

\wedge is "and" aka "conjunction"

Sometimes it's
symbolized as "&."

How we use it:

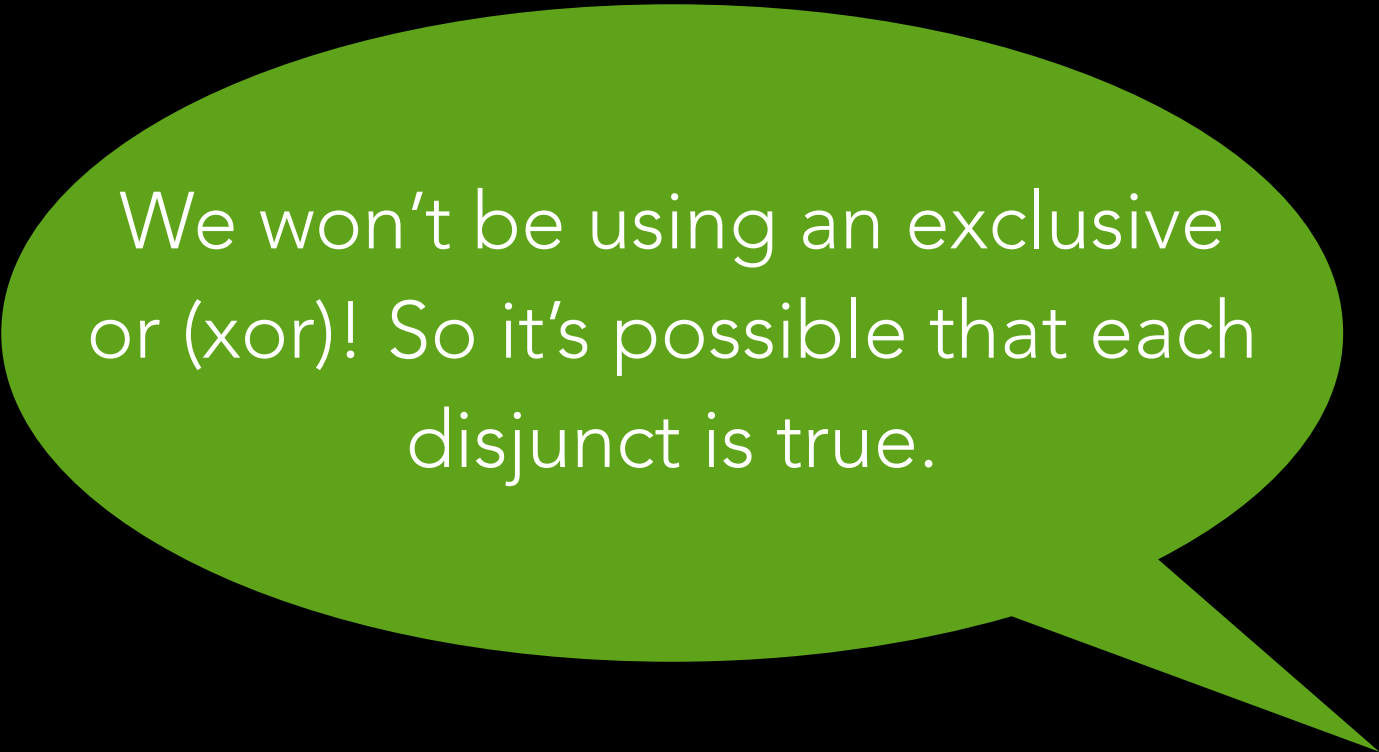
We symbolize "He's a white supremacist *and* he's a racist." as: $(C \wedge D)$

\vee is "or" aka "disjunction"

How we use it:

We symbolize "It's raining or you're in southern California." as:
 $(R \vee S)$

We call each component of the complex proposition a disjunct.



We won't be using an exclusive or (xor)! So it's possible that each disjunct is true.

→ is "if...then" aka "conditional"

Sometimes it's
symbolized as " \supset ."

How we use it:

We symbolize "If he's a white supremacist then he's a racist" as: $(C \rightarrow D)$

We call what's on the left the "antecedent" and what's on the right the "consequent."

\leftrightarrow is "if and only if" aka "biconditional"

Sometimes it's
symbolized as " \equiv ."

How we use it:

We symbolize "He's a white supremacist if and only if he's a racist" as: $(C \leftrightarrow D)$

The *biconditional* tells us the conditional goes both ways.

\sim or \neg is the "negation"

How we use it:

We symbolize "It's not the case that he's a racist" as $(\neg D)$.

Remember: negation is not the same thing as the opposite! "It's not the case that he's a racist" does not mean "He's an anti-racist"!

CONNECTIVES ARE OPERATORS
WHICH COMBINE ONE OR MORE
SENTENCES TO GENERATE
COMPLEX SENTENCES.

THERE ARE 5: \wedge , \vee , \rightarrow , \leftrightarrow , \sim