

English to Logic (1)

- Not all students take both history and biology.**
 $\neg \forall x \text{ student}(x) \Rightarrow [\text{takes}(x, \text{history}) \wedge \text{takes}(x, \text{biology})]$
 $\exists x \text{ student}(x) \wedge [\neg \text{takes}(x, \text{History}) \vee \neg \text{takes}(x, \text{Biology})]$
- No person likes a smart vegetarian.**
 $\forall x \forall y \text{ person}(x) \wedge \text{vegetarian}(y) \wedge \text{smart}(y) \Rightarrow \neg \text{likes}(x, y)$
 $\neg \exists x \exists y \text{ person}(x) \wedge \text{vegetarian}(y) \wedge \text{smart}(y) \wedge \text{likes}(x, y)$
- There is a woman who likes all men who are not vegetarians.**
 $\exists x \text{ woman}(x) \wedge (\forall y \text{ man}(y) \wedge \neg \text{vegetarian}(y) \Rightarrow \text{likes}(x, y))$
- The best score in history was better than the best score in biology.**
 $\forall x \forall y \text{ bestScore}(\text{History}, x) \wedge \text{bestScore}(\text{Biology}, y) \Rightarrow \text{better}(x, y)$
- Every person who dislikes all vegetarians is smart.**
 $\forall x (\text{person}(x) \wedge \forall y [\text{vegetarian}(y) \Rightarrow \neg \text{likes}(x, y)]) \Rightarrow \text{smart}(x)$

1

English to Logic (2)

- There is a barber who shaves all men in town who do not shave themselves.**
 $\exists x \text{ barber}(x) \wedge (\forall y \text{ townman}(y) \wedge \neg \text{shaves}(y, y) \Rightarrow \text{shaves}(x, y))$
 $\exists x \text{ barber}(x) \wedge \neg \exists y \text{ townman}(y) \wedge \neg \text{shaves}(y, y) \wedge \neg \text{shaves}(x, y)$
- No person likes a professor unless the professor is smart.**
 $\forall x \forall y [\text{person}(x) \wedge \text{professor}(y)] \Rightarrow [\text{likes}(x, y) \Rightarrow \text{smart}(y)]$
 $\neg \exists x \exists y \text{ person}(x) \wedge \text{professor}(y) \wedge \text{likes}(x, y) \wedge \neg \text{smart}(y)$
- Only one student failed both history and biology.**
 $\exists! x \text{ student}(x) \wedge \text{failed}(x, \text{History}) \wedge \text{failed}(x, \text{Biology})$
Note: $(\exists! x p(x) \Leftrightarrow \exists x p(x) \wedge (\forall y p(y) \Rightarrow x = y))$
- Politicians can fool some of the people all the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time.**
 $\forall x \text{ politician}(x) \Rightarrow \left\{ \begin{array}{l} \exists y \text{ people}(y) \wedge (\forall t \text{ time}(t) \Rightarrow \text{fool}(x, y, t)) \\ \exists t \text{ time}(t) \wedge (\forall y \text{ people}(y) \Rightarrow \text{fool}(x, y, t)) \\ \neg [\forall y \forall t \text{ people}(y) \wedge \text{time}(t) \Rightarrow \text{fool}(x, y, t)] \end{array} \right.$

2

And-Or-If

- One more outburst like that and you'll be in contempt of court.
outburst \Rightarrow *court*
NOT: *outburst* \wedge *court*
- Either the Red Sox win or I'm out ten dollars.
redSoxWin \Leftrightarrow \neg *outTenDollars*
NOT: *redSoxWin* \vee *outTenDollars*
- Maybe I'll come to the party and maybe I won't.
maybeComeToParty \vee \neg *maybeComeToParty*
NOT: *maybeComeToParty* \wedge \neg *maybeComeToParty*

3

Weird Logic

- I don't jump off the Empire State Building implies if I jump off the empire state building, then i float safely to the ground.
Vertaling in de geest van de zin is niet mogelijk.
 $\neg \text{jumpESB} \Rightarrow (\text{jumpESB} \Rightarrow \text{floatTTGround})$
 $\neg \text{jumpESB} \Rightarrow (\neg \text{jumpESB} \vee \text{floatTTGround})$
 $\text{jumpESB} \vee \neg \text{jumpESB} \vee \text{floatTTGround}$
 \square
- It is not the case that if you attempt this exercise you will get an F. Therefore, you will attempt this exercise.
Vertaling in de geest van de zin is niet mogelijk.
 $\neg(\text{attempt} \Rightarrow \text{getF}) \Rightarrow \text{attempt}$
 $\neg(\neg \text{attempt} \vee \text{getF}) \Rightarrow \text{attempt}$
 $(\text{attempt} \wedge \neg \text{getF}) \Rightarrow \text{attempt}$
 \square

4