

Sample Solutions to Homework Handout #1: Translating from Propositional Logic

Instructions: Use the given interpretations to translate the following sentences of propositional logic into natural English sentences.

A: "Emily is an aardvark"

B: "Emily eats ants"

C: "Emily plays in the sun"

X: "Carolyn is an aardvark"

Y: "Carolyn eats ants"

Z: "Carolyn plays in the shade"

1.  $B \cdot \sim Y$

Emily eats ants but Carolyn does not.

2.  $\sim C \vee Z$

Either Emily does not play in the sun or Carolyn plays in the shade.

3.  $\sim X \supset Z$

If Carolyn isn't an aardvark, then she plays in the shade.

4.  $B \equiv Y$

Emily eats ants if, and only if, Carolyn does.

5.  $\sim(A \cdot \sim X)$

It's not the case that Emily is an aardvark and Carolyn isn't.

6.  $(A \cdot Y) \vee (\sim X \cdot B)$

Either Emily is an aardvark and Carolyn eats ants, or Carolyn is not an aardvark and Emily eats ants.

7.  $(Y \supset B) \cdot \sim(B \supset \sim Z)$

If Carolyn eats ants then Emily does, and Emily's eating ants does not entail that Carolyn doesn't play in the shade.

8.  $[(\sim X \vee Z) \supset (\sim C \vee B)] \cdot [(\sim X \cdot A) \supset (\sim Y \cdot Z)]$

If either Carolyn is not an aardvark or she plays in the shade then either Emily doesn't play in the sun or she eats ants; however, if Carolyn is not an aardvark but Emily is, then Carolyn doesn't eat ants, but she plays in the shade.