### Definition: Equivalence

A ⇔ BLet A and B be statements. The equivalence (also called the “if and only if operator,” or A B A ⇔ B A B.A ⇔ B iff

for short) of and is written as . It is read “ is equivalent to ”

is false exactly when one of the two statements is true and the other statement is

false. Otherwise if both statements are true or both statements are false, is true.

In common literature, the symbol ℤ is often used for equivalence instead of ℤ. Both signs mean the same thing. We use the second option.

D :=Let A := “7 is an even number,” B := “3 is greater than 4,” A B C := “7 is an odd number,” andC D Example: Equivalence

“4 is greater than 3.” Then statements and are false and statements and are The equivalence C A ⇔ BD is true because both A A and C B are false. Likewise, ! C ⇔ D is true true.

In contrast, A ⇔ C is false, because is false, and is true. because both and are true.

Please do not confuse the equivalence ℤ with the logical equivalence ℤ The operator ℤ links the operator statements to propositional logical formulas (which themselves have a truth value), whileℤ indicates that two statements have the same truth value.