Review of Negation

Simple statements
If \( p = \text{‘It is 6:00’} \), then \( \sim p = \text{‘It is not 6:00’} \).

Conjunctions
Use DeMorgan’s Law: \( \sim (p \land q) \equiv \sim p \lor \sim q \).
For example, if \( p = \text{‘It is 6:00’} \) and \( q = \text{‘I am hungry’} \), then \( p \land q = \text{‘It is 6:00 and I am hungry’} \). The negation of this statement is \( \sim (p \land q) \equiv \sim p \lor \sim q = \text{‘Either it is not 6:00 or I am not hungry’} \).

Disjunctions
Use DeMorgan’s Law: \( \sim (p \lor q) \equiv \sim p \land \sim q \).
For example, if \( p = \text{‘It is 6:00’} \) and \( q = \text{‘I am hungry’} \), then \( p \lor q = \text{‘Either it is 6:00 or I am hungry’} \). The negation of this statement is \( \sim (p \lor q) \equiv \sim p \land \sim q = \text{‘It is not 6:00, and I am not hungry’} \).

Conditionals
The negation of \( p \rightarrow q \) is \( p \land \sim q \). That is, \( \sim (p \rightarrow q) \equiv p \land \sim q \).
For example, if \( p = \text{‘It is 6:00’} \) and \( q = \text{‘I am hungry’} \), then \( p \rightarrow q = \text{‘If it is 6:00, then I am hungry’} \). The negation of this statement is \( \sim (p \rightarrow q) \equiv p \land \sim q = \text{‘It is 6:00, and I am not hungry’} \).

Quantified statements
Recall the table in Section 3.10. Examples:
If \( p = \text{‘All men are mortal’} \), then \( \sim p = \text{‘Some men are not mortal’} \). Correspondingly, if \( q = \text{‘Some men are not mortal’} \), then \( \sim q = \text{‘All men are mortal’} \).
If \( p = \text{‘No men are mortal’} \), then \( \sim p = \text{‘Some men are mortal’} \). Correspondingly, if \( q = \text{‘Some men are mortal’} \), then \( \sim q = \text{‘No men are mortal’} \).