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PHILOS 12A / DIS 102

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Problem Set #7

Exercise 8.1

1. *Affirming the Consequent*: From A → B and B, infer A. - **Invalid**

2. *Modus Tollens*: From A → B and ¬B, infer ¬A. - **Valid**

3. *Strengthening the Antecedent*: From B → C, infer (A ∧ B) → C. – **Valid**

4. *Weakening the Antecedent*: From B → C, infer (A ∨ B) → C. - **Invalid**

5. *Strengthening the Consequent*: From A → B, infer A → (B ∧ C). – **Invalid**

6. *Weakening the Consequent*: From A → B, infer A → (B ∨ C). - **Valid**

7. *Constructive Dilemma*: From A∨B, A → C, and B → D, infer C ∨ D. - **Valid**

8. *Transitivity of the Biconditional*: From A ↔ B and B ↔ C, infer A ↔ C. – **Valid**

Exercise 8.6

The proof starts with A being either a Large Tetrahedron or a Small Cube. There are only two possible shapes and two possible sizes for A. In the second statement, B being Small is an eliminated choice, so B will either be Medium or Large. The third statement is an “if… then” statement explaining that if A is a Tetrahedron or a Cube, then B is Large or Small. From modus ponens, it can be established that B is Large because A will either be a Tetrahedron or a Cube based on the first statement. This information is crucial because of the last statement before the conclusion. It states that A is a Tetrahedron only if B is Medium. Since B is Large and not Medium, then A is not a Tetrahedron via biconditional elimination. As a result, it can be stated that A is a Small Cube and B is Large. The conclusion is A is Small and B is Large. The proof ends.

Exercise 8.14

To get to Irrational(x) → Irrational(), the proof will start with using the proof of contrapositive. If ( is rational, then that would also mean that x is rational. As a result of that, () can be obtained. M can be any number, and N can be any number except for zero. Squaring both sides would result in (). This is rational because is an integer and is also an integer. Every square of a number is rational, so this would also prove through the contrapositive proof that if Irrational(x) → Irrational().