

CSI 30 LECTURE NOTES (Ojakian)

Topic 4: Rules of Inference AND Propositional Logic Proofs

OUTLINE

(References: 1.6)

1. Rules of Inference
 2. Propositional Proofs
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1. Mathematical Proof

- (a) An argument that goes from the assumptions to the conclusion in a deductive manner.
- (b) Example: Consider summing two evens. What can you say? Can you prove it? Experiment with numbers.
- (c) The steps in a proof can be thought of as putting Inference Rules into action.
- (d) **We now focus on Propositional Logic proofs!**

2. Inference Rules

- (a) Forms of reasoning that are always valid: If the premises are true then the conclusion is true.
- (b) Key Rules: See Inference Rules handout.
- (c) Putting the rules together into a proof
 - i. Example: Section 1.6.4 (page 77): Example 6
 - ii. Example (they try): Section 1.6.4 (page 77-78): Example 7
 - iii. Example (quantifiers). Section 1.6.7 (page 80): Example 12.
 - iv. Example (they try). Section 1.6.7 (page 80 - 81): Example 13.
- (d) Fallacies
 - i. Fallacy of affirming the conclusion. Example: Section 1.6.6 (page 79): Example 10.
- (e) Propositional Logic Exercises. Section 1.6 (pages 82ff):
 - i. Propositional Logic Inference Rules: 1 - 4, 7, 8
 - ii. Propositional Logic Proofs: 5, 6
 - iii. Drawing your own conclusions: 9, 10
- (f) Quantifier Logic Exercises. Section 1.6 (pages 82ff):
 - i. Analyzing proofs: 13, 14
 - ii. Proof Checking: 15, 16
 - iii. Fallacies: 17, 18, 23, 24
 - iv. Proof Checking: 19, 20
 - v. Quantifiers proofs: 25 - 35