

Proofs

Sections 1.5, 1.6 and 1.7 of Rosen

Fall 2008

CSCE 235 Introduction to Discrete Structures

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Outline

- Motivation
- Terminology
- Rules of inference:
 - Modus ponens, addition, simplification, conjunction, modus tollens, contrapositive, hypothetical syllogism, disjunctive syllogism, resolution,
 - Examples
- Fallacies
- Proofs with quantifiers
- Types of proofs:
 - Trivial, vacuous, direct, by contrapositive (indirect), by contradiction (indirect), by cases, existence and uniqueness proofs; counter examples
- Proof strategies:
 - Forward reasoning; Backward reasoning; Alerts

Motivation (1)

- “Mathematical proofs, like diamonds, are hard and clear, and will be touched with nothing but strict reasoning.” *-John Locke*
- Mathematical proofs are, in a sense, the only true knowledge we have.
- They provide us with a guarantee as well as an explanation (and hopefully some insight).