Mathematical Logic and Proofs

Mathematics is really about proving general statements via arguments, usually called *proofs*. As you no doubt know from arguing with friends, not all arguments are good arguments. A “bad” argument is one in which the conclusion does not follow from the premises, i.e., the conclusion is not a consequence of the premises. Logic is the study of what makes an argument good or bad. Mathematical logic is the subfield of *philosophical logic* devoted to logical systems that have been sufficiently formalized for mathematical study.

- Friendly Introduction to Mathematical Logic (Leary & Kristiansen)
- Mathematical Reasoning - Writing and Proof (Sundstrom)
- Gentle Introduction to the Art of Mathematics (Fields)


- An Introduction to Proof via Inquiry-Based Learning (Ernst)
Transition to Higher Mathematics (Dumas and McCarthy)

Thumbnail: P. Oxy. 29, one of the oldest surviving fragments of Euclid's Elements, a textbook used for millennia to teach proof-writing techniques. The diagram accompanies Book II, Proposition 5. (Public Domain). Text from Oscar Levin's Discrete Mathematics text (CC BY-SA).