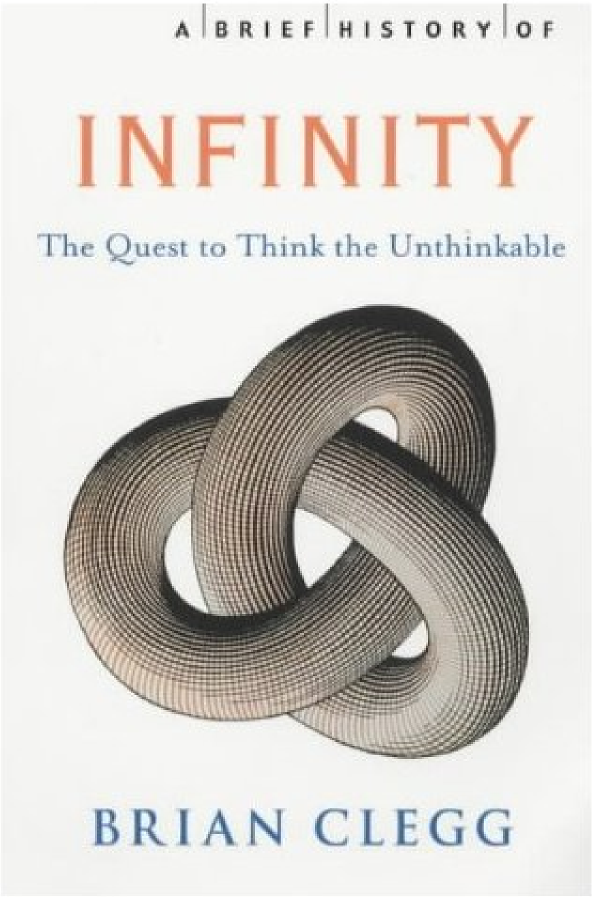
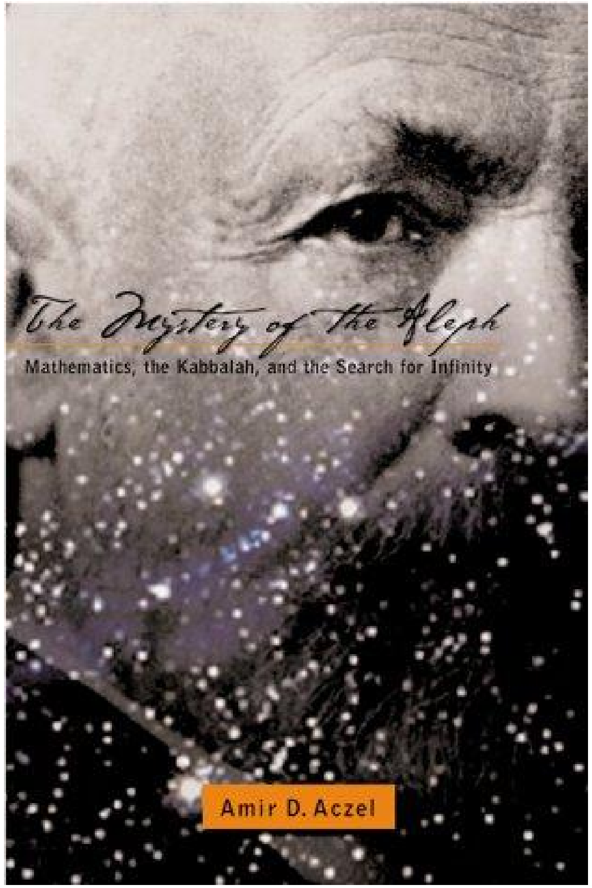
Direct Proofs

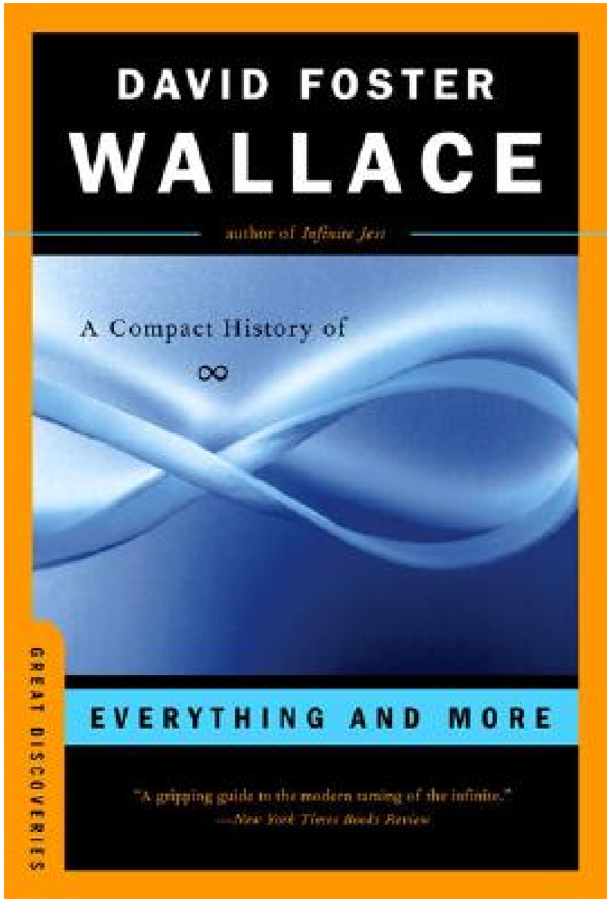
Recommended Reading



A Brief History of Infinity



The Mystery of the Aleph



Everything and More

Recommended Courses

Math 161: Set Theory

Outline for Today

- **Mathematical Proof**
  - What is a mathematical proof? What does a proof look like?
- **Direct Proofs**
  - A versatile, powerful proof technique.
- **Universal and Existential Statements**
  - What exactly are we trying to prove?
- **Proofs on Set Theory**
  - Formalizing our reasoning.

What is a Proof?

A ***proof*** is an argument that demonstrates why a conclusion is true.

A ***mathematical proof*** is an argument that demonstrates why a mathematical statement is true.

$*54 \cdot 43.$ $\vdash :. \alpha, \beta$ … $= \Lambda . \equiv . \alpha \cup \beta \in 2$

Dem.

$\vdash . *54$ … $\vdash :. \alpha =$ … $\iota ` y . \supset : \alpha \cup \beta \in 2 . \equiv . x$ …

$[*51 \cdot 2$ … $\equiv . \iota ` x$ … $= \Lambda .$

$[*13 \cdot$ … $\equiv . \alpha \cap$ … $\quad (1)$

$\vdash . (1)$ … $11 \cdot 35 . \supset$

$\vdash$ … $y) . \alpha = \iota ` x . \beta = \iota ` y .$ … $\in 2 . \equiv . \alpha \cap$ … $\quad (2)$

$\vdash . (2) .$ … $. *52 \cdot 1 . \supset \vdash .$ Prop

From this p…on it will follow, when a…tion has been defined, that 1 + …

Two Quick Definitions

- An integer n is ***even*** if there is some integer k such that $n = 2k$.
  - This means that 0 is even.
- An integer n is ***odd*** if there is some integer k such that $n = 2k + 1$.
- We'll assume the following for now:
  - Every integer is either even or odd.
  - No integer is both even and odd.