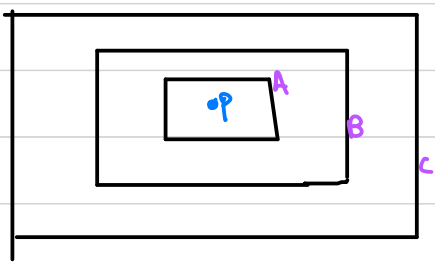
Proofs!

Types of Proofs

Direct

$A \to B \to C \to \ldots \to X \to Y \to Z$ proves $A \to Z$

Spatial intuition:



if point P is inside rectangle A, then point P must be in rectangle C.

Constructive

can be useful if "proof by example"
- proving a "there exists" stmt
- disproving a "for all" stmt

$\exists$ = there exists
$\forall$ = for all

↳ known as a "counterexample"

examples:

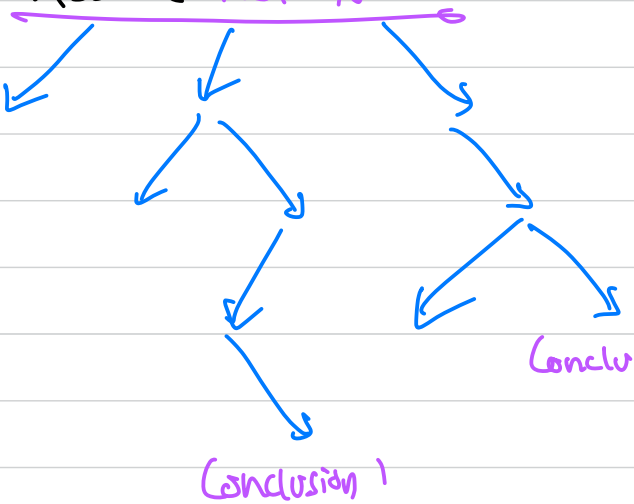
↳ seeing <u>one</u> alien is enough to prove existence of aliens

↳ disprove all integers are even by giving <u>one</u> odd integer

Contradiction

Want to prove X

Assume not X



make many conclusions based on the assumption not X

Main idea:
- if assumption not X, then Conc. 1
- also if assumption not X, then Conc. 2
- if Conc. 1 and Conc 2 cannot both be true, we cannot possibly have not X
- therefore, X

Extra Contraposition

$A \Rightarrow B$ is equivalent to $\neg B \Rightarrow \neg A$