## Chapter 4 roadmap:

- Subset proofs (day)
- Set equality and emptiness proofs (Wednesday)
- Conditional and biconditional proofs (Today)
- Proofs about powersets (next week Monday)
- Review for Test 2 (next week Wednesday)
- Test 2, on Chapters 3 & 4 (next week Friday, Oct 18)

## Today:

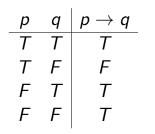
- Proofs of conditional propositions
- Proofs about numbers
- Proofs of biconditional propositions

General forms:

- 1. Facts (p) Set forms
  - 1. Subset  $X \subseteq Y$
  - 2. Set equality X = Y
  - 3. Set emptiness  $X = \emptyset$
- 2. Conditionals  $(p \rightarrow q)$
- 3. Biconditionals  $(p \leftrightarrow q)$

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To prove  $p \rightarrow q$ Suppose p $\dots$ q $p \rightarrow q$ 

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An integer x is even if  $\exists k \in \mathbb{Z} \mid x = 2k$ . An integer x is odd if  $\exists k \in \mathbb{Z} \mid x = 2k + 1$ .

"Axiom 3." If  $x, y \in \mathbb{Z}$ , then  $x + y \in \mathbb{Z}$ . (*Closure of addition*) "Axiom 4." If  $x, y \in \mathbb{Z}$ , then  $x \cdot y \in \mathbb{Z}$ . (*Closure of multiplication*) "Axiom 5." If  $x \in \mathbb{Z}$ , then x is even iff x is not odd.

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$$\forall x, y \in \mathbb{Z}, x \mid y \text{ (read, "x divides y") if } \exists k \in \mathbb{Z} \mid x \cdot k = y.$$
  
Note that  $y/x = k \text{ or } \frac{y}{x} = k \text{ or } \frac{k}{x \mid y}.$ 

## For next time:

Pg 162: 4.4.(1, 4, 5) Pg 164: 4.5.(2 & 5)

*Review 1.8, especially Ex 1.8.14 Skim 4.7* 

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Take quiz