Chapter 4 roadmap:

- Subset proofs (Monday)
- Set equality and emptiness proofs (**Today**)
- Conditional and biconditional proofs (Wednesday)
- Proofs about powersets (new week Wednesday)
- From theorems to algorithms (next week Friday)
- (Start Chapter 5 week after next)

Today:

- Proofs that sets are equal
- Proofs that a set is empty

Project proposal due Friday, Feb 17.

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 ($p \leftrightarrow q$)

$$(r \vee p) \wedge (p \vee q) \wedge (r \vee \sim p) \wedge (p \vee (q \vee r)) \equiv (p \vee q) \wedge r$$

$$(r \vee p) \wedge (p \vee q) \wedge (r \vee \sim p) \wedge (p \vee (q \vee r))$$

$$\equiv (r \vee p) \wedge (r \vee \sim p) \wedge (p \vee q) \wedge (p \vee (q \vee r)) \quad \text{by commutativity}$$

$$\equiv (r \vee (p \wedge \sim p)) \wedge (p \vee q) \wedge (p \vee (q \vee r)) \quad \text{by distributivity}$$

$$\equiv (r \vee F) \wedge (p \vee q) \wedge (p \vee (q \vee r)) \quad \text{by negation}$$

$$\equiv r \wedge (p \vee q) \wedge (p \vee (q \vee r)) \quad \text{by identity}$$

$$\equiv r \wedge (p \vee (q \wedge (q \vee r))) \quad \text{by distributivity}$$

$$\equiv r \wedge (p \vee q) \quad \text{by absorption}$$

$$\equiv (p \vee q) \wedge r \quad \text{by commutativity}$$

For next time:

Pg 160: 4.3.(3, 14, 15, 18)
Pg 161: 4.4.(5 & 6)

See assignment on Schoology for hint on Ex 4.3.15.

Read 4.(5–8)
Take quiz

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