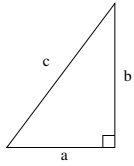
Chapter 4 roadmap:

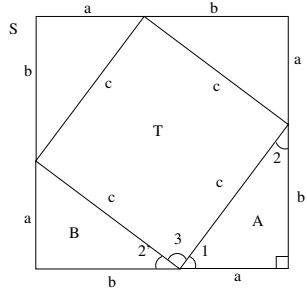
- Subset proofs (**Today**)
- Set equality and emptiness proofs (Wednesday)
- Conditional and biconditional proofs (Friday)
- Proofs about powersets (new week Monday)
- (Test 2, Friday, Oct 18)

Today:

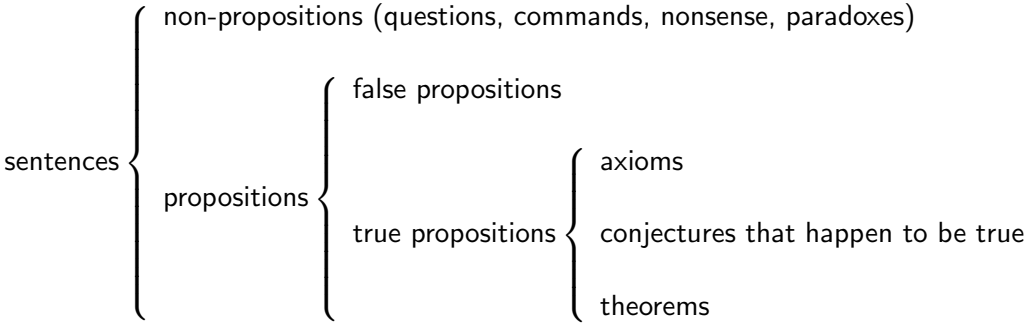
- Finishing a few bits about quantification
- Game plan for Chapter 4
- Anatomy of a proof
- Proof examples

$$
\begin{aligned}
&\sim (\forall\, x \in X, P(x)) \\
&\quad \equiv \quad \sim (P(x_1) \wedge P(x_2) \wedge \cdots) \\
&\quad \equiv \quad \sim P(x_1) \vee \sim P(x_2) \vee \cdots \quad \text{By DeMorgan's Law} \\
&\quad \equiv \quad \exists\, x \in X \mid \sim P(x)
\end{aligned}
$$





$\triangle A \cong \triangle B$	SSS
$\angle 1 + \angle 2 = 90^\circ$	$\triangle$ angles sum to 180°
$\angle 1 + \angle 2' = 90^\circ$	$\angle 2 \cong \angle 2'$
$\angle 3 = 90^\circ$	Supplementary $\angle$s
T is a square	Equal sides, 90° $\angle$s
Area of $T = c^2$	Area of $\square$
Area of $S = (a+b)^2$	Area of $\square$
Area of each $\triangle = \frac{ab}{2}$	Area of $\triangle$
$(a+b)^2 = c^2 + 4\frac{ab}{2}$	Sum of areas
$a^2 + 2ab + b^2 = c^2 + 2ab$	Algebra (FOIL, simplification)
$\therefore\ c^2 = a^2 + b^2$	Subtract $2ab$ from both sides.


sentences
non-propositions (questions, commands, nonsense, paradoxes)
propositions
false propositions
true propositions
axioms
conjectures that happen to be true
theorems

General forms:

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

$$X \cup Y = \{z \mid z \in X \vee z \in Y\} \qquad X - Y = \{z \mid z \in X \wedge z \notin Y\}$$

$$X \cap Y = \{z \mid z \in X \wedge z \in Y\} \qquad X \times Y = \{(x, y) \mid x \in X \wedge y \in Y\}$$

$$\overline{X} = \{z \mid z \notin X\}$$

For next time:

Do Exercises 4.1.(2–6, 8)

Read 4.(2 & 3)

Take quiz