Chapter 4 roadmap:

▶ Subset proofs (Today)
▶ Set equality and emptiness proofs (Friday)
▶ Conditional and biconditional proofs (next week Monday)
▶ Proofs about powersets (new week Wednesday)
▶ From theorems to algorithms (next week Friday)

Today:

▶ Transition point in course
▶ Game plan for Chapter 4
▶ Anatomy of a proof
▶ Proof examples

Project proposal due next week Monday, Oct 2.
\[ \triangle A \cong \triangle B \]

\[ \angle 1 + \angle 2 = 90^\circ \]
\[ \angle 1 + \angle 2' = 90^\circ \]
\[ \angle 3 = 90^\circ \]

\( T \) is a square

Area of \( T = c^2 \)

Area of \( S = (a + b)^2 \)

Area of each \( \triangle = \frac{ab}{2} \)

\[ (a + b)^2 = c^2 + 4 \frac{ab}{2} \]

\[ a^2 + 2ab + b^2 = c^2 + 2ab \]

\[ \therefore c^2 = a^2 + b^2 \]

SSS

\( \triangle \) angles sum to \( 180^\circ \)
\[ \angle 2 \cong \angle 2' \]

Supplementary \( \angle \)s

Equal sides, \( 90^\circ \) \( \angle \)s

Area of \( \square \)

Area of \( \square \)

Area of \( \triangle \)

Sum of areas

Algebra (FOIL, simplification)

Subtract \( 2ab \) from both sides.
sentences

\{ non-propositions (questions, commands, nonsense, paradoxes) \}

propositions

\{ false propositions, true 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 \((p \rightarrow q)\)

3. Biconditionals \((p \leftrightarrow q)\)
\[ X \cup Y = \{ z \mid z \in X \lor z \in Y \} \]

\[ X - Y = \{ z \mid z \in X \land z \notin Y \} \]

\[ X \cap Y = \{ z \mid z \in X \land z \in Y \} \]

\[ X \times Y = \{ (x, y) \mid x \in X \land y \in Y \} \]

\[ \overline{X} = \{ z \mid z \notin X \} \]
For next time:

Pg 158: 4.2.(2–7)

Review 4.(1 & 2)
Read 4.(3 & 4)

Take quiz