Chapter 3 & 4.1-4.3.

3.1: proof strategy.
3.2: $\neg$, $\rightarrow$.
3.3: $\forall$, $\exists$
3.4: $\wedge$, iff
3.5: $\vee$,
*3.6: $\exists!$
3.7: more examples.

4.1 $\times$
*4.2 relations
*4.3 $R \subseteq A \times A$.

4.1 $A \times B = \{(a,b) \mid a \in A, b \in B\}$.
$(a_1, b_1) = (a_2, b_2)$ iff $a_1 = a_2$, $b_1 = b_2$.

4.2 A relation from A to B is $R \subseteq A \times B$.
aRb to mean $(a,b) \in R$.
The domain of R is $Dom(R) = \{a \in A \mid \exists b \in B \ aRb\}$.
the range of R is $Ran(R) = \{b \in B \mid \exists a \in A \ aRb\}$.
the inverse of R is $R^{-1} = \{(b,a) \mid aRb\}$.
the composition of $R \subseteq A \times B$ and $S \subseteq B \times C$ is
$S \circ R = \{(a,c) \in A \times C \mid \exists b \in B, aRb \wedge bSc\}$.

4.3: A relation on A is $R \subseteq A \times A$.
R is reflexive if $\forall a \in A \ aRa$ iff $(i_A \subseteq R)$.
R is semmetric if $\forall x, y \in A$, $xRx \rightarrow yRy$ (iff $R = R^{-1}$)
R is tranisitive if $\forall x, y, z \in A$. $xRy \wedge yRz \rightarrow xRz$
iff $R \circ R \subseteq R$.

3.6 $\exists! x \in A \ P(x)$.
$\exists x \in A (P(x) \wedge \forall y \in A (P(y) \rightarrow x = y))$.
$\exists x \in A \ P(x)$. at $\cancel{x}$ = ...