Theorem

For any sets A, B, C, we have

1. $\emptyset \cap A = \emptyset$ *and* $\emptyset \cup A = A$;
2. $A \cap B \subseteq A \subseteq A \cup B$;
3. $A \cup B = B \cup A$ *and* $A \cap B = B \cap A$;
4. $A \cup (B \cup C) = (A \cup B) \cup C$ *and* $A \cap (B \cap C) = (A \cap B) \cap C$;
5. $A \cup A = A \cap A = A$
6. $A \subseteq B \implies A \cap C \subseteq B \cap C$ *and* $A \cup C \subseteq B \cup C$;
7. $A \cap (B \cup C) = (A \cap B) \cup (B \cap C)$ *and* $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

As you can see in the video, each of these rules has a corresponding propositional rule, e.g. see #2 and

$$P \wedge Q \implies P \implies P \vee Q.$$