

$$\begin{aligned}
 & (c \Rightarrow a) \wedge (\neg c \Rightarrow b) \Leftrightarrow (c \wedge a) \vee (\neg c \wedge b) \vee (a \wedge b) \\
 \Leftrightarrow & (\neg c \vee a) \wedge (\neg c \vee b) \text{ by } \dots \times 2 \\
 & (\neg c \vee a) \wedge (c \vee b) \text{ by neg} \\
 & ((\neg c \vee a) \wedge c) \vee ((\neg c \vee a) \wedge b) \text{ by distr} \\
 & ((\neg c \wedge c) \vee (a \wedge c)) \vee ((\neg c \wedge b) \vee (a \wedge b)) \text{ by distr} \\
 & (\text{false} \vee (a \wedge c)) \vee (\neg c \wedge b) \vee (a \wedge b) \text{ by contr} \\
 & (a \wedge c) \vee (\neg c \wedge b) \vee (a \wedge b) \text{ by simpl}
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & m \wedge (n \Rightarrow \neg(m \vee n)) \Leftrightarrow \neg(\neg n \Rightarrow m) \\
 & m \wedge (\neg n \vee \neg(m \vee n)) \text{ by impl} \\
 & m \wedge \neg(n \wedge (m \vee n)) \text{ by dm} \\
 & m \wedge \neg n \text{ by simpl} \\
 & \neg(\neg m \vee n) \text{ by dm} \\
 & \neg(m \Rightarrow n) \text{ by impl} \\
 & \neg(\neg n \Rightarrow \neg m) \text{ by contrapos}
 \end{aligned}$$