

Exercise 11.1

$$\begin{aligned}(\neg((\neg B \wedge D) \wedge (C \vee D)) \wedge (B \vee A)) &\equiv (\neg(\neg B \wedge (D \wedge (C \vee D)) \wedge (B \vee A))) && \text{(Associativity)} \\ &\equiv (\neg(\neg B \wedge (D \wedge (D \vee C)) \wedge (B \vee A))) && \text{(Commutativity)} \\ &\equiv (\neg(\neg B \wedge D) \wedge (B \vee A)) && \text{(Absorption)} \\ &\equiv ((\neg \neg B \vee \neg D) \wedge (B \vee A)) && \text{(De Morgan)} \\ &\equiv ((B \vee \neg D) \wedge (B \vee A)) && \text{(Double Negation)} \\ &\equiv (B \vee (\neg D \wedge A)) && \text{(Distributivity)}\end{aligned}$$

Exercise 11.2

Exercise 11.3

(a)

(b)

Exercise 11.4

Exercise 11.5

(a)

(b)