

2.37.1. Deduction Problems

Show that each of the following formal arguments is valid by constructing a **deduction** for it.

A.

1. $(P \vee \sim Q) \cdot (R \vee \sim \sim Q) \cdot \sim R \therefore P$
2. $(P \wedge \sim Q) \cdot (Q \vee \sim S) \cdot (R \vee S) \therefore R$
3. $((\sim P \vee Q) \wedge \sim R) \cdot \sim Q \cdot (R \vee (P \vee S)) \therefore S$
4. $(P \vee Q) \cdot (\sim Q \vee \sim R) \cdot R \therefore (P \wedge \sim Q)$
5. $(R \vee P) \cdot (Q \vee T) \cdot (\sim R \wedge \sim T) \cdot (\sim(P \wedge Q) \vee S) \therefore S$

B.

1. $(P \vee S) \cdot (Q \vee R) \cdot \sim \sim(\sim R \wedge \sim S) \therefore (P \wedge Q)$
2. $(P \vee Q) \cdot (\sim Q \vee \sim R) \cdot (R \vee S) \cdot \sim P \therefore S$
3. $P \cdot (\sim P \vee Q) \cdot (\sim Q \vee R) \therefore (Q \wedge R)$
4. $(P \wedge \sim R) \cdot (\sim P \vee Q) \cdot (T \vee \sim S) \cdot (R \vee S) \therefore (Q \wedge T)$
5. $(P \wedge Q) \cdot (\sim Q \vee \sim \sim R) \therefore ((P \vee S) \wedge R)$
6. $(P \vee Q) \cdot (\sim(P \vee Q) \vee R) \cdot (\sim R \vee \sim P) \therefore Q$
7. $\sim P \cdot (P \vee Q) \cdot ((P \vee S) \vee \sim(Q \vee S)) \therefore S$
8. $((Q \vee S) \wedge R) \cdot (\sim(R \vee T) \vee \sim S) \therefore Q$
9. $(P \vee Q) \cdot \sim P \cdot (\sim(\sim P \wedge Q) \vee R) \therefore R$
10. $(\sim(P \vee (Q \wedge R)) \vee \sim P) \cdot (\sim(R \vee S) \vee \sim \sim T) \cdot (P \vee (Q \wedge R)) \therefore (\sim P \wedge T)$