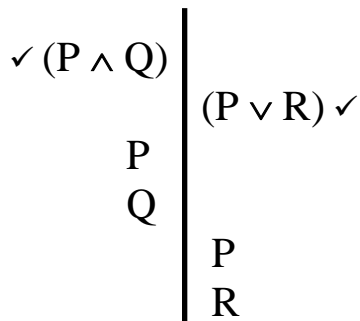


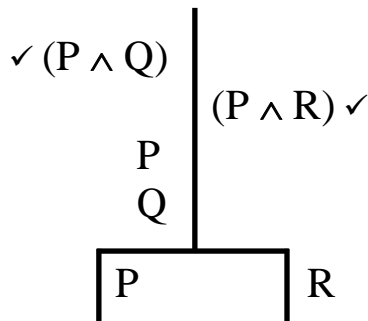
2.23.1. Truth Tree Problems

A. For each of the following truth trees, state for each **tree path** whether it **violates** the **Principle of Bivalence**. (If a tree path violates Bivalence, state which **sentence letter(s)** on that path are to blame.)

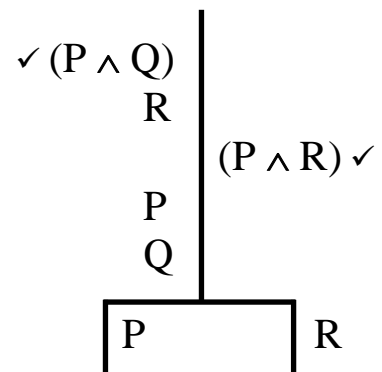
(1)



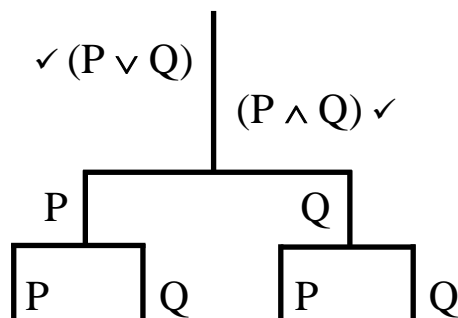
(2)



(3)



(4)



B. Based on your answers to the problems in (A), state for each of the following arguments whether that argument is **valid**.

1. $(P \wedge Q) \therefore (P \vee R)$

2. $(P \wedge Q) \therefore (P \wedge R)$

3. $(P \wedge Q) \cdot R \therefore (P \wedge R)$

4. $(P \vee Q) \therefore (P \wedge Q)$

C For each of the following arguments, use a **truth tree** to show whether or not the argument is **valid**.

1. $P \therefore (P \vee Q)$

2. $P \therefore \sim(P \wedge Q)$

3. $P \therefore (P \wedge Q)$

4. $Q \cdot R \therefore (Q \wedge R)$

5. $(P \wedge \sim Q) \cdot \sim R \therefore (Q \vee R)$

6. $\sim(P \vee Q) \cdot (R \wedge \sim S) \therefore (Q \vee R)$