Logical Equivalences

1. **Associative laws**

   $p \vee (q \vee r) \iff (p \vee q) \vee r$ $\qquad$ $p \wedge (q \wedge r) \iff (p \wedge q) \wedge r$

2. **Commutative laws**

   $p \vee q \iff q \vee p$ $\qquad$ $p \wedge q \iff q \wedge p$

3. **Distributive laws**

   $p \vee (q \wedge r) \iff (p \vee q) \wedge (p \vee r)$ $\qquad$ $p \wedge (q \vee r) \iff (p \wedge q) \vee (p \wedge r)$

4. **de Morgan's laws**

   $\neg(p \vee q) \iff \neg p \wedge \neg q$ $\qquad$ $\neg(p \wedge q) \iff \neg p \vee \neg q$

5. **Idempotent laws**

   $p \vee p \iff p$ $\qquad$ $p \wedge p \iff p$

6. **Identity laws**

   $p \vee \mathrm{F} \iff p$ $\qquad$ $p \wedge \mathrm{T} \iff p$

7. **Domination laws**

   $p \vee \mathrm{T} \iff \mathrm{T}$ $\qquad$ $p \wedge \mathrm{F} \iff \mathrm{F}$

8. **Absorption laws**

   $p \wedge (p \vee q) \iff p$ $\qquad$ $p \vee (p \wedge q) \iff p$

9. **Double negation law**

   $$\neg(\neg p) \iff p$$

10. **Negation laws**

    $p \vee \neg p \iff \mathrm{T}$ $\qquad$ $p \wedge \neg p \iff \mathrm{F}$

11. **Equivalence of Implication**

    $$p \to q \iff \neg p \vee q$$

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