Valid Forms for Sentential Logic

Valid Argument Forms of Inference

1. **Modus Ponens (MP):**

   $p \supset q$

   $p \quad /\therefore q$

2. **Modus Tollens (MT):**

   $p \supset q$

   $\sim q \quad /\therefore \sim p$

3. **Disjunctive Syllogism (DS):**

   $p \vee q$

   $\sim p \quad /\therefore q$

   $p \vee q$

   $\sim q \quad /\therefore p$

4. **Simplification (Simp):**

   $p \cdot q \quad /\therefore p$

   $p \cdot q \quad /\therefore q$

5. **Conjunction (Conj):**

   p

   $q \quad /\therefore p \cdot q$

6. **Hypothetical Syllogism (HS):**

   $p \supset q$

   $q \supset r \quad /\therefore p \supset r$

7. **Addition (Add):**

   $p \quad /\therefore p \vee q$

8. **Constructive Dilemma (CD):**

   $p \vee q$

   $p \supset r$

   $q \supset s \quad /\therefore r \vee s$

Valid Equivalence Forms (Rule of Replacement)

9. **Double Negation (DN):**

   $p :: \sim\sim p$

10. **DeMorgan's Theorem (DeM):**

    $\sim (p \cdot q) :: (\sim p \vee \sim q)$

    $\sim (p \vee q) :: (\sim p \cdot \sim q)$

11. **Commutation (Comm):**

    $(p \vee q) :: (q \vee p)$

    $(p \cdot q) :: (q \cdot p)$

12. **Assocation (Assoc):**

    $[p \vee (q \vee r)] :: [(p \vee q) \vee r]$

    $[p \cdot (q \cdot r)] :: [(p \cdot q) \cdot r]$

13. **Distribution (Dist):**

    $[p \cdot (q \vee r)] :: [(p \cdot q) \vee (p \cdot r)]$

    $[p \vee (q \cdot r)] :: [(p \vee q) \cdot (p \vee r)]$

14. **Contraposition (Contra):**

    $(p \supset q) :: (\sim q \supset \sim p)$

15. **Implication (Impl):**

    $(p \supset q) :: (\sim p \vee q)$

16. **Exportation (Exp):**

    $[(p \cdot q) \supset r] :: [p \supset (q \supset r)]$

17. **Tautology (Taut):**

    $p :: (p \cdot p)$

    $p :: (p \vee p)$

18. **Equivalence (Equiv):**

    $(p \equiv q) :: [(p \supset q) \cdot (q \supset p)]$

    $(p \equiv q) :: [(p \cdot q) \vee (\sim p \cdot \sim q)]$

Conditional and Indirect Proof

Conditional Proof

p **AP** $/\therefore q$

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q

$p \supset q$ **CP**

Indirect Proof

$\sim p$ **AP** $/\therefore p$

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$q \cdot \sim q$

p **IP**