**Logical Laws**

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| **Equivalences** | **Name** |
| p ∧ T ≡ p  p ∨ F ≡ p | Identity laws |
| p ∨ T ≡T  p ∧ F ≡F | Domination laws |
| p ∨p≡p  p ∧p≡p | Idempotent laws |
| p ∧(p ∨ q) ≡ p  p∨(p ∧ q) ≡ p | Absorption laws |
| ¬ ( ¬ p) ≡ p | Double negation law |
| p ∨ q ≡q∨ p  p ∧ q ≡q∧ p | Commutative laws |
| (p ∨ q) ∨ r ≡ p ∨ (q ∨ r)  (p ∧ q) ∧ r ≡ p ∧ (q ∧ r) | Associative laws |
| p ∨ (q ∧ r) ≡ (p ∨ q) ∧ (p ∨ r)  p ∧ (q ∨ r) ≡ (p ∧ q) ∨ (p ∧ r) | Distributive laws |
| ¬ (p ∧ q) ≡¬ p ∨¬ q  ¬ (p ∨ q) ≡¬ p ∧¬ q | De Morgan's laws |

**Logical equivalences involving implications**

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| p → q ≡¬p ∨ q  p → q ≡¬q→¬p  p ∨ q ≡¬p → q  p ∧ q ≡¬(p →¬q)  ¬(p → q) ≡ p ∧¬q  (p → q) ∧ (p → r) ≡ p → (q ∧ r)  (p → r) ∧ (q → r) ≡ (p ∨ q) → r  (p → q) ∨ (p → r) ≡ p → (q ∨ r)  (p → r) ∨ (q → r) ≡ (p ∧ q) → r |

**Logical equivalences involving biconditionals**

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| p ↔ q ≡ (p → q) ∧ (q → p)  p ↔ q ≡¬p ↔¬q | p ↔ q ≡ (p ∧ q) ∨ (¬p ∧¬q)  ¬(p ↔ q) ≡ p ↔¬q |

**Different terminologies to express**

“If , then ” “ implies ” “ onlyif ” “If , ” “ is sufficient for ” “a sufficient condition for is ” “ if ” “ when ” ( “ whenever ” “ is necessary for ” “a necessary condition for is ” “ follows from ” “ unless ”

**Determine whether the following system specifications are consistent.**

1. “The diagnostic message is stored in the buffer or it is retransmitted. The diagnostic message is not stored in the buffer. If the message is stored in the buffer, then it is retransmitted. ”

2. “The system is in multi user state if and onlyif it is operating normally. If the system is operating normally, the kernel is functioning. The kernel is not functioning or the system is in interrupt mode. If the system is not in multi user state, then it is in interrupt mode. The system is not in interrupt mode.”

3. “The router can send packets to the edge system, onlyif it supports the new address space. For the router to support the new address space, it is necessary that the latest software release to be installed. The router can send packets to the edge system if the latest software release is installed. The router does not support the new address space.”