1. (P ^ Q) ^ (P v -Q)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | -Q | (P ^ Q) | (P v -Q) | (P^Q) ^ (P v -Q) |
| V | V | F | V | V | V |
| V | F | V | F | V | F |
| F | V | F | F | F | F |
| F | F | V | F | F | F |

1. (P^-Q) V (-P^-Q)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | Q | -P | -Q | -P^-Q | P^-Q | (P^-Q) v (-P^-Q) |
| V | V | F | F | F | F | F |
| V | F | F | V | F | V | V |
| F | V | V | F | F | F | F |
| F | F | V | V | V | F | V |

1. (P v-Q) ^ R

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | -Q | (P v –Q) | (P v -Q) ^ R |
| V | V | V | F | V | V |
| V | F | F | V | V | V |
| F | V | V | F | V | V |
| F | F | F | V | F | F |

1. (P v Q) ^ R

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | P v Q | (P v Q) ^ R |
| V | V | V | V | V |
| V | F | F | V | F |
| F | V | V | V | V |
| F | F | F | F | F |

1. (P^Q) -> R

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | P ^ Q | (P ^ Q) -> R |
| V | V | V | V | V |
| V | F | F | F | F |
| F | V | V | F | F |
| F | F | F | F | F |

1. (P v Q) -> R

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | P v Q | (P v Q) -> R |
| V | V | V | V | V |
| V | F | F | V | F |
| F | V | V | V | V |
| F | F | F | F | V |

1. (P -> Q) ^ (Q -> P)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | P -> Q | Q -> P | (P -> Q) ^ (Q -> P) |
| V | V | V | V | V |
| V | F | F | V | F |
| F | V | V | F | F |
| F | F | F | V | V |

1. [(P->Q) V (-Q^R)] <-> (R->Q)]

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | -Q | -Q ^ R | P -> Q | R -> Q | (P->Q) v (-Q^R) | [(P->Q) v (-Q^R)] <-> (R->Q)] |
| V | V | V | F | V | V | V | V | V |
| V | V | F | F | F | V | V | V | V |
| V | F | V | V | F | F | V | F | F |
| V | F | F | V | F | F | V | F | F |
| F | V | V | F | V | V | F | V | F |
| F | V | F | F | F | V | V | V | V |
| F | F | V | V | F | V | V | V | V |
| F | F | F | V | F | V | V | V | V |

1. - [(P v Q) -> R]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | (P V Q) | [(P V Q) ->R] | -[(P V Q) ->R] |
| V | V | V | V | V | F |
| V | V | F | V | V | F |
| V | F | V | V | V | F |
| V | F | F | V | V | F |
| F | V | V | V | V | F |
| F | V | F | V | V | F |
| F | F | V | F | F | V |
| F | F | F | F | V | F |

1. - [(P v Q) <-> R

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | (P v Q) | (P v Q) <-> R | -(P vQ) <-> R |
| V | V | V | V | V | F |
| V | V | F | V | F | V |
| V | F | V | V | V | F |
| V | F | F | V | F | V |
| F | V | V | V | V | F |
| F | V | F | V | F | V |
| F | F | V | F | F | V |
| F | F | F | F | V | F |

1. Q -> (P ^ R)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (P ^ R) | Q-> (P ^ R) |
| V | V | V | V | V |
| V | V | F | F | F |
| V | F | V | V | V |
| V | F | F | F | V |
| F | V | V | F | F |
| F | V | F | F | F |
| F | F | V | F | V |
| F | F | F | F | V |

1. (P v Q )-> - (R ^ -S)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | S | -S | (P v Q) | (R^-S) | -(R^-S) | (P v Q) -> -(R^-S) |
| V | V | V | V | F | V | F | V | V |
| V | V | V | F | V | V | V | F | F |
| V | V | F | V | F | V | F | V | V |
| V | V | F | F | V | V | F | V | V |
| V | F | V | V | F | V | F | V | V |
| V | F | V | F | V | V | V | F | F |
| V | F | F | V | F | V | F | V | V |
| V | F | F | F | V | V | F | V | V |
| F | V | V | V | F | V | F | V | V |
| F | V | V | F | V | V | V | F | F |
| F | V | F | V | F | V | F | V | V |
| F | V | F | F | V | V | F | V | V |
| F | F | V | V | F | F | F | V | V |
| F | F | V | F | V | F | V | F | V |
| F | F | F | V | F | F | F | V | V |
| F | F | F | F | V | F | F | V | V |

1. -[ -(P v Q) <-> (R v S)]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | S | -S | (P v Q) | (R v -S) | -(P v Q) | -(R v -S) | -[ -(P v Q)<->(R v -S)] |
| V | V | V | V | F | V | V | F | F | V |
| V | V | V | F | V | V | V | F | F | V |
| V | V | F | V | F | V | F | F | V | F |
| V | V | F | F | V | V | V | F | F | V |
| V | F | V | V | F | V | V | F | F | V |
| V | F | V | F | V | V | V | F | F | V |
| V | F | F | V | F | V | F | F | V | F |
| V | F | F | F | V | V | V | F | F | V |
| F | V | V | V | F | V | V | F | F | V |
| F | V | V | F | V | V | V | F | F | V |
| F | V | F | V | F | V | F | F | V | F |
| F | V | F | F | V | V | V | F | F | V |
| F | F | V | V | F | F | V | V | F | F |
| F | F | V | F | V | F | V | V | F | F |
| F | F | F | V | F | F | F | V | V | V |
| F | F | F | F | V | F | F | V | V | V |

1. Q <-> (P ^ R)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (P ^ R) | Q <-> (P ^ R) |
| V | V | V | V | V |
| V | V | F | F | F |
| V | F | V | V | F |
| V | F | F | F | V |
| F | V | V | F | F |
| F | V | F | F | F |
| F | F | V | F | V |
| F | F | F | F | V |

1. (P ^ Q) v (R v –S)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | S | -S | (P ^ Q) | (R v -S) | (P ^ Q) v (R v -S) |
| V | V | V | V | F | V | V | V |
| V | V | V | F | V | V | V | V |
| V | V | F | V | F | V | F | V |
| V | V | F | F | V | V | V | V |
| V | F | V | V | F | F | V | V |
| V | F | V | F | V | F | V | V |
| V | F | F | V | F | F | F | F |
| V | F | F | F | V | F | V | V |
| F | V | V | V | F | F | V | V |
| F | V | V | F | V | F | V | V |
| F | V | F | V | F | F | F | F |
| F | V | F | F | V | F | V | V |
| F | F | V | V | F | F | V | V |
| F | F | V | F | V | F | V | V |
| F | F | F | V | F | F | F | F |
| F | F | F | F | V | F | V | V |

1. P <-> Q

|  |  |  |
| --- | --- | --- |
| P | Q | P <-> P |
| V | V | V |
| V | F | F |
| F | V | F |
| F | F | V |

1. P -> -Q

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | -Q | P -> -Q |
| V | V | F | F |
| V | F | V | V |
| F | V | F | V |
| F | F | V | V |

1. P v Q

|  |  |  |
| --- | --- | --- |
| P | Q | P v Q |
| V | V | V |
| V | F | V |
| F | V | V |
| F | F | F |

1. P ^ Q

|  |  |  |
| --- | --- | --- |
| P | Q | P ^ Q |
| V | V | V |
| V | F | F |
| F | V | F |
| F | F | F |

1. P -> Q

|  |  |  |
| --- | --- | --- |
| P | Q | P -> Q |
| V | V | V |
| V | F | F |
| F | V | V |
| F | F | V |