**Section 1.4**

**Part One**

Complete the following truth table.



**Part Two**

Assuming that p → q is the original implication, match columns A-D with their proper vocabulary names.

* Contrapositive
* Converse
* Inverse
* Negation

**Part Three**

Define these three terms

* Tautology
* Contradiction
* Logically Equivalent

**Part Four**

Complete the following truth tables to demonstrate the named Laws of Propositional Logic

**Associative Laws**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | Proposition #1 | Proposition #2 |
| p | q | r |  |  |  |  | ( p ^ q ) ^ r | p ^ ( q ^ r ) |
| T | T | T |  |  |  |  |  |  |
| T | T | F |  |  |  |  |  |  |
| T | F | T |  |  |  |  |  |  |
| T | F | F |  |  |  |  |  |  |
| F | T | T |  |  |  |  |  |  |
| F | T | F |  |  |  |  |  |  |
| F | F | T |  |  |  |  |  |  |
| F | F | F |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | Proposition #1 | Proposition #2 |
| p | q | r |  |  |  |  | ( p ∨ q ) ∨ r | p ∨ ( q ∨ r ) |
| T | T | T |  |  |  |  |  |  |
| T | T | F |  |  |  |  |  |  |
| T | F | T |  |  |  |  |  |  |
| T | F | F |  |  |  |  |  |  |
| F | T | T |  |  |  |  |  |  |
| F | T | F |  |  |  |  |  |  |
| F | F | T |  |  |  |  |  |  |
| F | F | F |  |  |  |  |  |  |

**Distributive Laws**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | Proposition #1 | Proposition #2 |
| p | q | r |  |  |  |  | p ∨ ( q ^ r ) | (p∨q) ^ (p∨r) |
| T | T | T |  |  |  |  |  |  |
| T | T | F |  |  |  |  |  |  |
| T | F | T |  |  |  |  |  |  |
| T | F | F |  |  |  |  |  |  |
| F | T | T |  |  |  |  |  |  |
| F | T | F |  |  |  |  |  |  |
| F | F | T |  |  |  |  |  |  |
| F | F | F |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | Proposition #1 | Proposition #2 |
| p | q | r |  |  |  |  | p ^ ( q ∨ r ) | (p^q) ∨ (p^r) |
| T | T | T |  |  |  |  |  |  |
| T | T | F |  |  |  |  |  |  |
| T | F | T |  |  |  |  |  |  |
| T | F | F |  |  |  |  |  |  |
| F | T | T |  |  |  |  |  |  |
| F | T | F |  |  |  |  |  |  |
| F | F | T |  |  |  |  |  |  |
| F | F | F |  |  |  |  |  |  |