Boolean Logic:

1. NOT
2. AND
3. OR
4. XOR

Input: Material (0/1)

Processor/Logic-Operation: By Definition

Output: Product/Response (0/1)

**NOT:** Reverse/Opposite

Number of Input: 1

Number of Output: 1

( 0/1 ) -> NOT -> ( 1/0 )

Formula: NOT(A) = A’/**A**/with bar above

A = 0, NOT( A ) = 1

A = 1, NOT( A ) = 0

**AND:** Both/All of them

Number of Input: 2 (Min)

Number of Output: 1

{ (0/1), (0/1) } -> AND -> (0/1)

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | Y |
| 1 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 |
| 3 | 1 | 0 | 0 |
| 4 | 1 | 1 | 1 |

Formula: Y = AB / A.B

A = 0, B = 1: Y = 0

A = 1, B = 1: Y = 1

A = 1, B = 0, C = 1, D = 1: Y = 0

**OR:** Either

Number of Input: 2 (Min)

Number of Output: 1

{ (0/1), (0/1) } -> OR -> (0/1)

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | Y |
| 1 | 0 | 0 | 0 |
| 2 | 0 | 1 | 1 |
| 3 | 1 | 0 | 1 |
| 4 | 1 | 1 | 1 |

Formula: Y = A + B / A v B

A = 1, B = 0, C = 0: Y = 1

A = 0, B = 0, C = 0, D = 0: Y = 0

**XOR:**

Number of Input: 2 (Min)

Number of Output: 1

{ (0/1), (0/1) } -> XOR -> (0/1)

|  |  |  |  |
| --- | --- | --- | --- |
|  | A | B | Y |
| 1 | 0 | 0 | 0 |
| 2 | 0 | 1 | 1 |
| 3 | 1 | 0 | 1 |
| 4 | 1 | 1 | 0 |

Formula: Y = A ^ B

Problem#1: Y = A + ( B . C )

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl | A | B | C | B . C | A + ( B . C ) |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 1 | 0 | 0 |
| 3 | 0 | 1 | 0 | 0 | 0 |
| 4 | 0 | 1 | 1 | 1 | 1 |
| 5 | 1 | 0 | 0 | 0 | 1 |
| 6 | 1 | 0 | 1 | 0 | 1 |
| 7 | 1 | 1 | 0 | 0 | 1 |
| 8 | 1 | 1 | 1 | 1 | 1 |

Home Work:

Problem#1: Y = A’ + ( B . C’ )

Problem#2: XOR = A’B + AB’ (Prove XOR by definition with the given expression)