

Logical operators (for bits/bytes)

- Bitwise
 - NOT, AND, XOR , OR
- Shift
 - Linear : LSHIFT, RSHIFT,
 - Circular : RCIRC, LCIRC
- Precedence
 - NOT,
 - SHIFT, CIRC,
 - AND ,
 - XOR,
 - OR

Truth Tables

X	NOT X
0	1
1	0

X	Y	X AND Y	X OR Y	X XOR Y
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	1	0

Truth Tables

- Linear shift , add 0s as padding (either left or right)
 - Shifting by word size (or more) would result in all 0s
- Circular shift just rolls over the bits (as per direction)
 - Shifting by the number of word size , same bit sequence would be produced

X	(LSHIFT-2 X)	(RSHIFT-3 X)	(LCIRC-3 X)	(RCIRC-1 X)
01101	10100	00001	01011	10110
10	00	00	01	01
1110	1000	0001	0111	0111
1011011	1101100	0001011	1011101	1101101

Operations (evaluate)

- 0110 AND 1011
- 1100 OR 0101
- 1010 XOR 1111
- 1010 AND 1100 OR 0001
- 0011 OR 1010 AND 0110
- (1100 XOR 1010) AND 0110

Operations (evaluate)

- 0110 AND 1011
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- 1010 AND 1100 OR 0001
- 0011 OR 1010 AND 0110
- (1100 XOR 1010) AND 0110

Operations : Shift (evaluate)

1. (LSHIFT-1 10101) AND (RSHIFT-2 11010)
2. (RCIRC-2 01111) OR (LSHIFT-3 10010)
3. (RSHIFT-1 11100) XOR (LCIRC-2 01011)
4. (LSHIFT-2 00110) OR (RCIRC-1 10101) AND (RSHIFT-3 11101)
5. (LCIRC-3 11001) AND (RSHIFT-2 10110)
6. (RCIRC-4 10011) OR (LSHIFT-1 01101)
7. (RSHIFT-3 11110) AND (LCIRC-1 00111) OR (LSHIFT-2 01010)
8. (LSHIFT-2 01101) OR (RCIRC-3 10110) AND (RSHIFT-1 11011)

Answers 1..3

1. (LSHIFT-1 10101) AND (RSHIFT-2 11010)

- → 01010 AND 00110

- → **00010**

2. (RCIRC-2 01111) OR (LSHIFT-3 10010)

1. → 11011 OR 10000

2. → **11011**

3. (RSHIFT-1 11100) XOR (LCIRC-2 01011)

1. → 01110 XOR 01101

2. → **00011**

Answers 4..6

4. (LSHIFT-2 00110) OR (RCIRC-1 10101) AND (RSHIFT-3 11101)
 - 11000 OR 11010 AND 00011 *//parenthesis evaluated first*
 - 11000 OR 00010 *// And has higher precedence so evaluated first*
 - **11010**
5. (LCIRC-3 11001) AND (RSHIFT-2 10110)
 - 01110 AND (RSHIFT-2 10110)
 - 01110 AND 00101
 - **00100**
6. (RCIRC-4 10011) OR (LSHIFT-1 01101)
 - 00111 OR 11010
 - **11111**

Answers 7..8

7. (RSHIFT-3 11110) AND (LCIRC-1 00111) OR (LSHIFT-2 01010)

- 00011 AND 01110 OR (01000)
- 00010 OR 01000
- **01010**

8. (LSHIFT-2 01101) OR (RCIRC-3 10110) AND (RSHIFT-1 11011)

- 11010 OR 11010 AND 01101
- 11010 OR 01000
- **11010**