



Python

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If both bits are FALSE then output is FALSE.

1-Binary AND

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- If both bits are TRUE then output is TRUE.
- If any bit is FALSE then output is FALSE.

Example

$$(16)_{10} = (00010000)_2$$

$$(14)_{10} = (00001110)_2$$

$$(16)_{10} \& (14)_{10} = (00000000)_2 = (0)_{10}$$

2- Binary OR

- If both bits are FALSE then output is FALSE.
- If both bits are TRUE then output is TRUE.
- If any input is TRUE then output is TRUE.

Example

$$(16)_{10} = (00010000)_2$$

$$(14)_{10} = (00001110)_2$$

$$(16)_{10} | (14)_{10} = (00011110)_2 = (30)_{10}$$

3- Binary XOR

- If both bits are FALSE then output is FALSE.
- If both bits are TRUE then output is FALSE.
- If one bit is TRUE and other is FALSE then output is TRUE.

Example

$$(16)_{10} = (00010000)_2$$

$$(14)_{10} = (00001110)_2$$

$$(16)_{10} \wedge (14)_{10} = (00011110)_2 = (30)_{10}$$

4- Binary 1s Complement

$$(16)_{10} = (00010000)_2 \text{ -----(A)}$$

Step-1: Take the complement

- If bit is Low then result is High.
- If bit is High then result is Low.
- In this case; 11101111

Step-2: +ve or -ve number

- If the 1st bit after the complement is 0, then final answer is +ve.
- If the 1st bit after the complement is 1, then final answer is -ve.

Step-3: +1 in number (A)

$$(00010001)_2 = (17)_{10}$$

Step-4: Final answer is $(-17)_{10}$

5- Binary Left Shift

$$(14)_{10} = (00001110)_2$$

$$(14 \ll 2)_{10} = (00111000)_2 = (56)_{10}$$

6- Binary Right Shift

$$(14)_{10} = (00001110)_2$$

$$(14 \gg 2)_{10} = (00000011)_2 = (3)_{10}$$