

Operators in C

100 MCQs

Which of the following is a relational operator in C?

- ❖ A) +
- ~~❖ B) == ← Relational~~
- ❖ C) *
- ❖ D) %

What will be the result of $5 / 2$ in C?

- ◆ A) $2.5 \leftarrow \text{double}$
- ◆ ~~B) $2 \leftarrow \text{int}$~~
- ◆ C) $2.0 \rightarrow \text{double}$
- ◆ D) $2.5f \leftarrow \text{float}$

$$\frac{\downarrow \text{int}}{\uparrow \text{int}} = \text{int}$$

Which operator is used for logical AND in C?

- ❖ A) &
- ❖ ~~B) &&~~
- ❖ C) |
- ❖ D) ||

AND → Bitwise &
Logical &&

What is the output of the expression $5 \% 2$?

- ◆ A) 2
- ◆ B) 3
- ~~◆ C) 1~~
- ◆ D) 0

int
↓
Remainder (int)

$\frac{5}{2} \rightarrow \text{Rem}=1 \text{ (int)}$

Which operator is used to increment a variable by 1?

↳ ++

- ❖ A) --
- ✓ ❖ B) ++
- ❖ C) +=
- ❖ D) -

What does the \neq operator do?

- ◆ A) Assigns a value
- ~~◆ B) Checks for inequality~~
- ◆ C) Compares for equality
- ◆ D) Performs a bitwise AND

\neq is not equals to

$2 \neq 2 \leftarrow \text{false } (0)$

$3 \neq 2 \leftarrow \text{true } (1)$

Which of the following is a bitwise operator?

- ❖ A) $\&\&$ ← Logical
- ❖ ~~B) | ← Bitwise OR~~
- ❖ C) $!=$ ← Relational
- ❖ D) + → Arithmetic

What will be the value of x after $x *= 3$ if x was initially 4?

- A) 12
- B) 7
- C) 9
- D) 6

$$\begin{array}{ccc} x = 4 & (\text{int}) & \\ x *= 3 & \leftarrow & x = x * 3 \\ & & \xrightarrow{\quad} x = 4 * 3 \\ & \curvearrowleft & \\ & \text{Compound Assignment operator} & \\ & \downarrow \text{Augmented} & \end{array}$$

Which of the following operators has the highest precedence?

- ❖ A) +
- ❖ ~~B) ++~~ ← unary
- ❖ C) *
- ❖ D) / } same

True
false

What is the output of the expression $10 < 5 ? \underline{1} : 0$?

- ◆ A) 1
- ◆ ~~B) 0~~
- ◆ C) 10
- ◆ D) 5

$? :$ } trinary op.

$x = \underbrace{\text{Condition}}_{?} ? \text{ if true} : \text{if false}$

$10 < 5 ? \underline{1} : 0$
false \uparrow

What is the purpose of the sizeof operator?

- ❖ A) Calculates the length of a string
- ❖ B) Allocates memory dynamically
- ❖ ~~C)~~ Returns the size of a data type or variable
- ❖ D) Compares two values

Bytes
of datatype

Sizeof (int) → 4

Which operator is used for bitwise XOR in C?

- ◆ A) &
- ◆ B) |
- ◆ C) ^
- ◆ D) ~

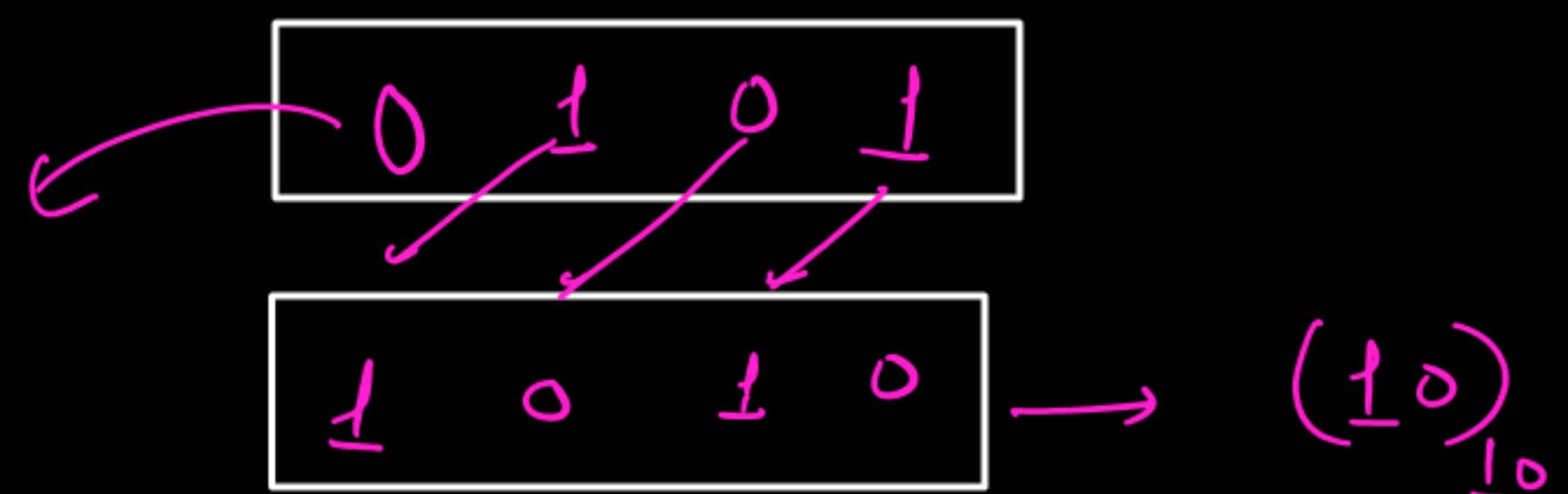
$$a \wedge b \rightarrow a \text{ XOR } b$$

What will be the output of the expression $5 \ll 1$? position

- ◆ A) 10
- ◆ B) 5
- ◆ C) 2
- ◆ D) 1

Bitwise left shift
Shift $\begin{cases} \text{left} \rightarrow \text{multiply by 2} \\ \text{right} \rightarrow \text{Divide by 2} \end{cases}$ } integer

$$(5)_{10} \rightarrow (0101)_2$$



Which operator is used for logical NOT in C?

- ❖ A) !
- ❖ B) ~
- ❖ C) ^
- ❖ D) &

44 {
! } logical
|| }
^

What will the expression 7 & 3 yield?

- ◆ A) 7
- ◆ ~~B) 3~~
- ◆ C) 0
- ◆ D) 1

↓

bitwise

$$\begin{array}{r} [0\ 1\ 1\ 1]_2 \rightarrow (7)_{10} \\ [0\ 0\ 1\ 1]_2 \rightarrow (3)_{10} \\ \hline 0\ 0\ 1\ 1 \end{array} \rightsquigarrow (3)_{10}$$

What does the << operator do in C?

- ~~◆ A) Logical shift left~~
Bitwise
- ◆ B) Logical shift right
- ◆ C) Bitwise OR
- ◆ D) Bitwise XOR

What is the result of $3 + 4 * 2$ considering operator precedence?

- ❖ A) 14
- ❖ B) 11
- ❖ C) 10
- ❖ D) 8

$$\begin{array}{c} 3 + 8 \\ \downarrow \\ 11 \end{array}$$

* ↑
+ ↑

Which operator is used for bitwise complement in C?

◆ A) &

◆ B) |

◆ C) ^

◆ D) ~ ← One's Complement

$$x = 2;$$

$$\Rightarrow (0010) \rightsquigarrow \text{1's Complement}$$

$$\sim [0010] = [1101]$$

What is the result of $\underbrace{-5}_{\text{J}} \gg 1$?

Divide by 2 (int)

- A) -3
- B) -2
- C) -4
- D) -5

Signed integer \rightarrow 2's Complement form

$$(-5)_{10} \rightarrow \underbrace{0 \dots 0}_2 \underbrace{0101}_{2^8} \xrightarrow{\downarrow} \underbrace{111\dots1}_{2^8} \underbrace{1010}_{2^0} \quad \text{32 bits}$$

2's Comp \Rightarrow

$$\begin{array}{r} \underbrace{1111\dots1}_{2^8} 1010 \\ + 1 \\ \hline (1\dots111011)_{10} \end{array} \rightarrow$$

$(1111\dots1011)_2$ through

$\boxed{01\dots\dots\dots111101}$

↓
-3

High num $\Rightarrow (-3)_{10}$

Which operator is used to assign a value to a variable?

~~◆ A) =~~

- ◆ B) == } Relational
- ◆ C) != } Relational
- ◆ D) += < Augmented / Compound

What does the $++i$ do compared to $i++$?

- ◊ A) Increments i after evaluation
- ◊ B) Increments i before evaluation
- ◊ C) Decrements i after evaluation
- ◊ D) Decrements i before evaluation

$++i \rightarrow$ increment first then
return the value

$i++ \rightarrow$ Return the value first
then increment

What will be the output of the expression $4 \underline{}/ 2 * 3$?

- A) 6
- B) 9
- C) 3
- D) 12

$$\frac{\text{int}}{\text{int}} = \text{int} \Rightarrow \underbrace{2 * 3}_6$$

/ * } Same
~~~~~  
left to right

Which operator is used to compare two values for equality?

- ❖ A) =
- ~~❖ B) ==~~
- ❖ C) !=
- ❖ D) >

What is the result of the expression  $10 / 3 * 2$ ?

- A) 6
- B) 4
- C) 3
- D) 7

$$\frac{\text{int}}{\text{int}} = \text{int}$$

$$\underbrace{10/3}_{\text{int}} * 2$$

$$3 * 2$$
$$\underbrace{\quad}_{\text{int}}$$
$$6$$

/ \* → Same  
↓  
left to right

Which operator is used for conditional checks in C?

~~◆ A) ?:~~

- ◆ B) &&
- ◆ C) ||
- ◆ D) ~

What will be the result of  $x = 5$  followed by  $x \&= 3$  if  $x$  was initially 5?

- ◆ A) 7
- ◆ B) 5
- ~~◆ C) 1~~
- ◆ D) 3

int  $x = 5$        $x \&= 3$        $x = x \& 3$   
 $x = 5 \& 3$

$x = (5)_{10} \& (3)_{10}$

$$\begin{array}{r} 101 \\ 011 \\ \hline 001 \end{array} \rightarrow (1)_{10}$$

Bitwise

Which of the following is an example of an assignment operator in C?

- ◆ A) == ← Comparison
- ◆ ~~B) +=~~ → Assignment  
↳ Compound       $x += 5 ;$   
 $\Rightarrow x = x + 5 ;$
- ◆ C) != ← Comparison
- ◆ D) && ← logical

What is the effect of the expression  $5 \wedge 3$  in C?

- ◆ A) 2
- ◆ ~~B) 6~~
- ◆ C) 8
- ◆ D) 1

$$\begin{array}{r} (5)_{10} \rightarrow [1 \ 0 \ 1]_2 \\ (3)_{10} \rightarrow [0 \ 1 \ 1]_2 \\ \hline [1 \ 1 \ 0]_2 \end{array}$$

$\hookrightarrow (6)_{10}$

XOR

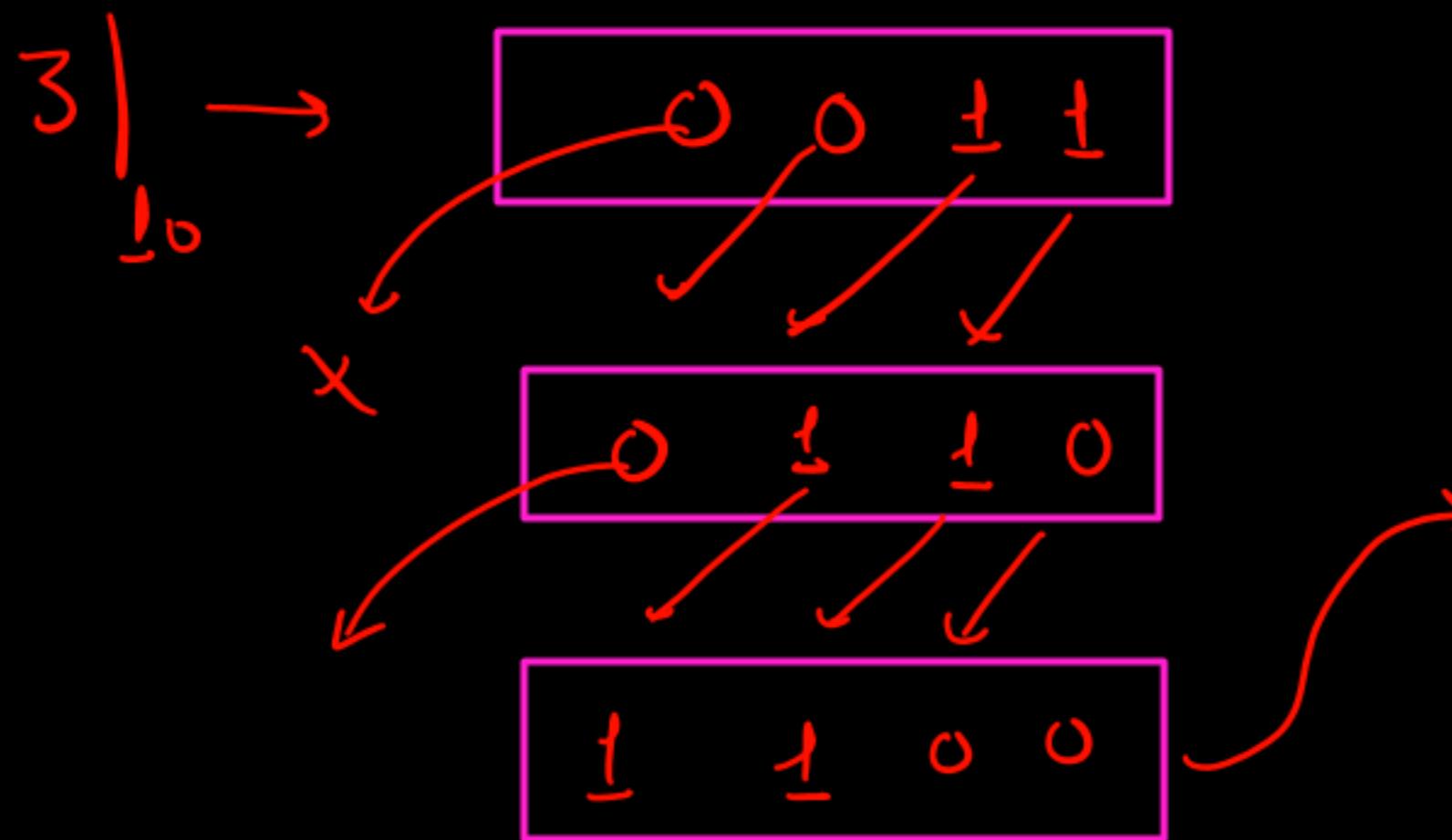
$\hookrightarrow$  Equality detector

$\hookrightarrow$  inputs are  
Unequal  $\rightarrow$  True

Otherwise  
 $\rightarrow$  false

What will be the value of x after the operation  $\underbrace{x \ll= 2}$  if x was initially 3?

- ◆ A) 12
- ◆ B) 6
- ◆ C) 7
- ◆ D) 9



$\text{int } x = 3;$   
 $x \ll= 2;$

$x = x \ll 2;$

$x = 3,$

$x \ll 2 \Rightarrow 3 \times 2 \times 2$

$3 \times 2^2 = 12$

$$1100_2 \rightarrow (12)_{10}$$

Bitwise Shift  
2 position  
left shift  $\Rightarrow x \times 2$

Which operator would you use to perform a bitwise NOT  
operation on an integer variable?

Complement

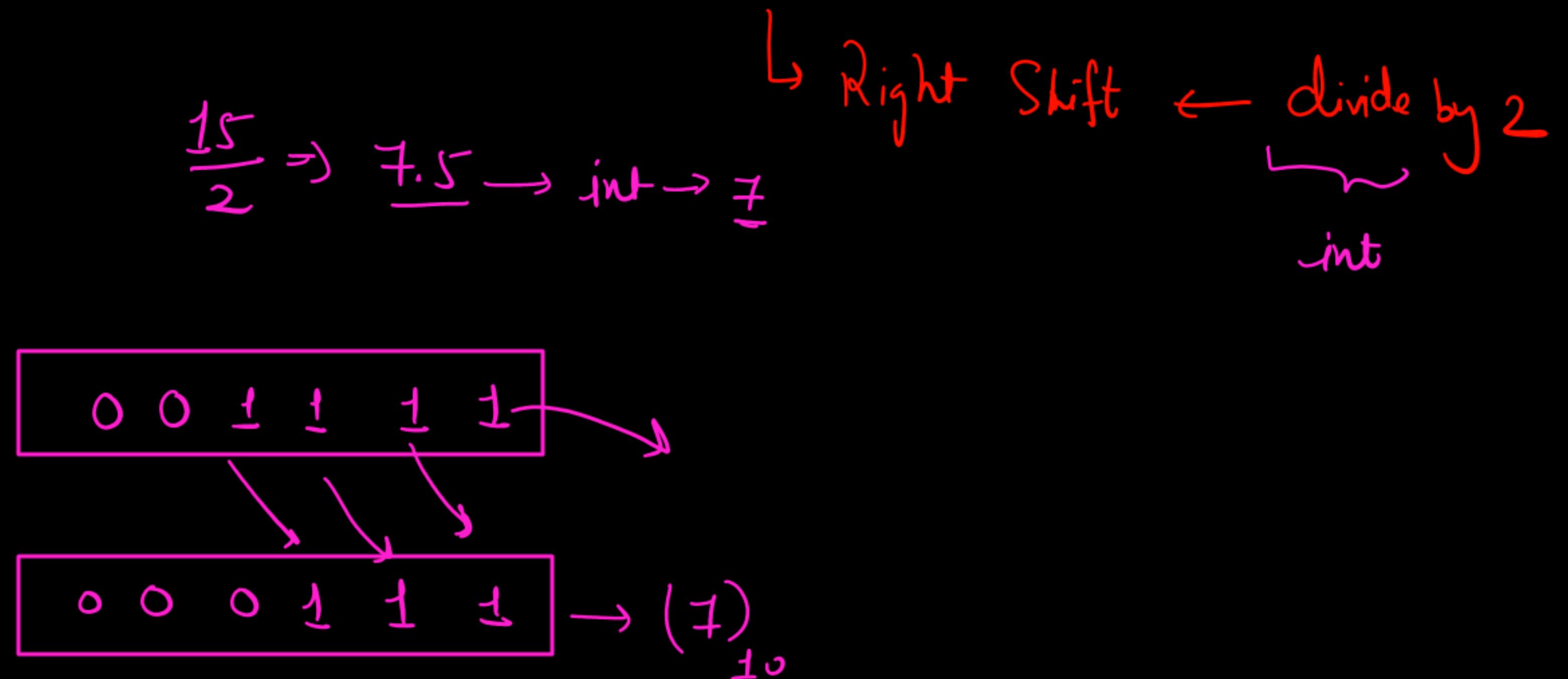
- A)  $\sim$
- B)  $!$
- C)  $\wedge$
- D)  $\&$

In C, which operator has the lowest precedence?

- ❖ A) \*
- ❖ B) +
- ❖ C) ==
- ❖ D) && → least

What will be the result of  $15 \gg 1$ ?

- ◆ A) 30
- ◆ ~~B) 7~~
- ◆ C) 15
- ◆ D) 8



What is the result of  $4 \& 7$ ?

$\downarrow$        $\overbrace{1}^1$   
int      int

- A) 4
- B) 7
- C) 3
- D) 0

$$\begin{array}{rcl} [4]_{10} & \rightarrow & 0100 \\ [7]_{10} & \rightarrow & \underline{\begin{array}{r} 0111 \\ -100 \\ \hline 1 \end{array}} \rightarrow (4)_{10} \end{array}$$

# What does the a ? b : c syntax represent in C?

- A) Ternary conditional operator
- B) Bitwise AND
- C) Bitwise OR
- D) Logical OR

What will be the result of  $3^5$ ?

A) 6

B) 2

C) 7

D) 1

Which operator is used for a bitwise left shift in C?

~~◆ A) <<~~

◆ B) >>

◆ C) &

◆ D) |

What is the effect of the  $a = b = c$  statement?

- ~~◆ A) Assigns the value of c to b and then assigns the result to a~~
- ◆ B) Assigns the value of a to b and then assigns the result to c
- ◆ C) Compares the values of a, b, and c
- ◆ D) Adds a, b, and c and assigns the result to a

= ← Right to left

Which operator would you use to get the address of a variable?

~~A) & ← address of~~

B) \*

C) +

D) -

$\&$  → bitwise AND (2 operands) ← Binary

Ex a&b

$\&\&$  → Logical AND (2 operands) ← Binary

Ex a && b

scanf("%d", &b)  
↓  
int  
    ↑  
    address of b

$\&$  ← address of operator (Unary)

Ex &b

    ↑  
    Return the address of b

What will be the result of the expression  $3 + 4 * 2 / (1 - 5) \% 2$ ?

◆ A) 1

◆ B) 0

◆ C) -1

◆ D) ~~2~~ 3

$$\begin{aligned} & 3 + 4 * 2 / (1 - 5) \% 2 \quad ( ) \\ & 3 + \underbrace{4 * 2}_{\cancel{+}} / -4 \% 2 \quad \cancel{*} / \% \left( \begin{array}{l} \text{left} \rightarrow \\ \text{right} \end{array} \right) \\ & 3 + \underbrace{8}_{\cancel{-}} / -4 \% 2 \quad + - \\ & 3 + \underbrace{-2}_{\cancel{\%}} \% 2 \\ & 3 + \cancel{0} \\ & \boxed{= 3} \end{aligned}$$

# What is the effect of the $\overset{\leftarrow}{\&=}$ b statement?

- ~~◆ A)~~ Performs a bitwise AND between a and b and assigns the result to a
- ◆ B) Performs a bitwise OR between a and b and assigns the result to a
- ◆ C) Adds a and b and assigns the result to a
- ◆ D) Subtracts b from a and assigns the result to a

Which operator is used for logical XOR in C?

~~A) ^~~

- ◆ B) &
- ◆ C) |
- ◆ D) !

What will be the result of the expression  $7 \% 4$ ?

~~A) 3~~

◆ B) 1

◆ C) 7

◆ D) 4

$$\begin{array}{r} \sqrt[4]{7\ 1} \\ \hline 4 \\ \overline{3} \end{array} \leftarrow \text{Rem}$$

↓  
Remainder

What is the result of  $-5 + \underbrace{8 * 3}_{\downarrow} / 2 - 1$  in C?

❖ A) 9

❖ B) 10

❖ C) 11

❖ D) 4

⇒ 6

$$-5 + \underbrace{24}_{\downarrow} / 2 - 1$$

$$-5 + \underbrace{12}_{\downarrow} - 1$$

$$= 7 - 1$$

$$= \underline{\underline{6}}$$

\* / ← Same  
+ - Same  
(Left to Right)

Given int x = 3; what will be the result of x++ + ++x?

- A) 8
  - B) 7
  - C) 6
  - D) 5

$$x = 3$$
$$\cancel{x}^{++} + \cancel{++x}^{++} \cancel{5}^{+4}$$
$$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$$

$x++$   
↳ x Return then increment  
 $++x \rightarrow$  increment then Return

What will be the result of the following expression:  $\sim 0$ ?

- ❖ A) 0
- ~~❖ B)~~ 1
- ❖ C) -1
- ❖ D) -2

Not  $0 = \underline{1}$

What is the effect of using the `<<` operator with a negative number? Provide the result of  $-4 \ll 1$ .

~~◆ A) -8~~

◆ B) 8

◆ C) 4

◆ D) -2

$$\Rightarrow \begin{pmatrix} \underbrace{111\dots}_{\text{1}} & \underbrace{11000}_2 \\ + 1 \\ \hline \underbrace{1000}_2 \end{pmatrix}$$

↓

$$(-4)_{10} \rightarrow (00100)_2$$

Signed 2<sub>b</sub> Complement  
32 bit int

$$\Rightarrow \begin{array}{c} \underbrace{0000\dots}_2^{\text{28}} \quad \underbrace{0100}_2 \xrightarrow{\text{2'}_b \text{ Complement}} \left( \underbrace{111\dots}_2^{\text{28}} \quad 1011 \right)_2 \end{array}$$

$2'^b$  Complement

$$\begin{array}{c} \underbrace{111\dots}_2^{\text{28 bit}} \quad \underbrace{1011}_2 \\ \xrightarrow{\text{Addition}} \left( \underbrace{1\dots1100}_2 \right)_2 \quad \left( \underbrace{1\dots1100}_2 \right)_2 \end{array}$$

$$\boxed{1 \quad 1 \quad 0 \quad 0}$$

What will be the result of the following code?

int a = 7;

int b = 3;

int result = a ^ (a & b);

◆ A) 4

$\text{r} = 7 \wedge 3$

◆ B) 2

◆ C) 7

◆ D) 5

$$\begin{aligned}\text{r} &= a \wedge (a \& b) \\ \text{r} &= 7 \wedge (\underbrace{7 \& 3})\end{aligned}$$

$$\begin{aligned}7 &\rightarrow 111 \\ 3 &\rightarrow \underline{011} \\ &\underline{\quad\quad\quad} \\ &\rightarrow (4)_{10}\end{aligned}$$

$$\begin{aligned}7 &= 111 \\ \& 3 = \underline{\& 011} \\ &\underline{\quad\quad\quad} \\ &\rightarrow (3)_{10}\end{aligned}$$

Explain the result of the expression  $10 / 3 * 3$  in C.

- ◆ A) 10
- ◆ B) 9
- ◆ C) 6
- ◆ D) 3

$$\underbrace{10/3}_{\text{ }} * 3$$

$$3 * 3 \\ = 9$$

/ \* → Same  
L L→R

int  
int = int

What is the result of  $-7 \% 3$ ?

~~◆ A) -1~~

◆ B) 1

◆ C) -2

◆ D) 2

$$\begin{array}{r} -7 \% 3 \\ \hline 3 \overline{) -7 } \quad (2 \\ \underline{-6} \end{array}$$
$$\begin{aligned} & -7 - (6) \\ & -7 + 6 \\ & = -1 \end{aligned}$$

Given int x = 7; and int y = 4;, what is the result of the expression  $x \wedge (y >> 1)$ ?

◆ A) ~~65~~

int  $x = 7$

$x \wedge (y >> 1)$

floor  
J  
Right Shift = division  
by 2

◆ B) 7

int  $y = 4$

$x \wedge (2)$

◆ C) 3

$= x \wedge 2 \Rightarrow 7 \wedge 2$

◆ D) 1

$\Rightarrow (7)_{10} \rightarrow 111$

$(2)_{10} \rightarrow \frac{010}{101_2} \rightarrow (5)_2$

What is the value of x after executing the following code?

```
int x = 10;  
x <<= 2;
```

- ❖ A) 20
- ❖ B) 40
- ❖ C) 10
- ❖ D) 30

$$\begin{aligned} \text{int } x = 10 \\ x &<\!= 2 \\ \hookrightarrow x &= x <\!= 2; \quad \text{2 बार } \times \text{ करेंगे \downarrow} \end{aligned}$$

$$\begin{aligned} x &= 10 \times 2^2 \\ &= \underbrace{10 \times 2}_{20} \times 2 \\ &= 40 \end{aligned}$$

What does the  $\neq$  operator return in the expression  $5 \neq 2 * 3$ ?

~~◆ A) 1~~

◆ B) 0

◆ C) 5

◆ D) 6

$$5 \neq 2 \underbrace{* 3}$$

\*  
 $\neq$

$$5 \neq 6$$

$\underbrace{\phantom{0}}$

True

What is the result of  $7 \& 3 | 4$ ?

- ◆ A) 4
- ~~◆ B) 7~~
- ◆ C) 3
- ◆ D) 5

$$\begin{array}{r} 7 \& 3 | 4 \\ \hline 7 & \rightarrow & 1 & 1 & 1 \\ 3 & & 0 & 1 & 1 \\ \hline 7 \& 3 = & \underline{\underline{0 & 1 & 1}} \end{array}$$

↑    ← High  
|    ← Low

$$4 \rightarrow \frac{0 & 1 & 1}{1 & 0 & 0} \rightarrow (7)_{10}$$

divide by 2

How does the `>>` operator affect the binary representation of a positive integer?

- ❖ A) It shifts the bits to the right, dividing the number by 2 for each shift.
- ❖ B) It shifts the bits to the left, multiplying the number by 2 for each shift.
- ❖ C) It performs a bitwise NOT operation.
- ❖ D) It performs a bitwise AND operation.

What is the output of the following code?

```
int a = 6;  
int b = 8;  
int result = a++ * --b;
```

- ❖ A) 48
- ❖ B) 42
- ❖ C) 36
- ❖ D) ~~44~~ 54

$$\begin{array}{c} a=7 \quad b=8 \\ a++ \quad * \quad --b \\ 6 \times 9 \\ \Rightarrow 54 \end{array}$$

$a++ \rightarrow$  Return first  
then increment

$--b \rightarrow$  Increment -  
first then return

What will be the result of the expression !0?

↓

1

- ❖ A) 0
- ~~❖ B) 1~~
- ❖ C) -1
- ❖ D) 2

What is the output of the following code snippet?

```
int a = 10;
```

```
int b = 3;
```

```
int result = (a * b) % a + b / 2;
```

A) 1

B) 4

C) 5

D) 8

$$a = 10, b = 3$$

$$\text{result} = (a * b) \% a + b / 2 ;$$

$$\text{result} = (10 * 3) \% 10 + 3 / 2$$

$$\text{result} = \underbrace{30 \% 10}_{0} + 3 / 2$$

$$0 + 3 / 2$$

$\xrightarrow{\text{int} \rightarrow \text{int}}$

$$\begin{array}{r} 2\sqrt{-3} \\ \underline{-2} \\ 1 \end{array}$$

$$\xrightarrow{* / \%}$$

+

How does the & operator work when used with integer values? Provide an example with 5 & 3.

- ~~◆ A)~~ It performs a bitwise AND operation, returning 1. -
- ◆ B) It performs a bitwise OR operation, returning 7.
- ◆ C) It performs a bitwise XOR operation, returning 6.
- ◆ D) It performs a logical AND operation, returning 0.

$$\begin{array}{r} 5 \longrightarrow 0101 \\ 3 \longrightarrow \underline{0011} \\ \hline 0001 \rightarrow 1 \end{array}$$

What is the result of  $2 \ll 3$  in C?

◆ A) 16

◆ B) 8

◆ C) 6

◆ D) 4

→ multiply by 2 for 3 times

$$2 \times 2^3 \\ \Rightarrow \underline{\underline{16}}$$

What will be the result of the following expression if x = 3 and y = 4?

int result = x + y \* (x - y) / x;

◆ A) -1

~~◆ B)~~ 2

◆ C) 0

◆ D) 5

Result =  $3 + 4 * (3 - 4) / 3$

$\times / \rightarrow \text{left} \rightarrow \text{right}$

$+ -$

$$3 + 4 * -1 / 3$$
$$3 + -4 / 3$$
$$\frac{-4}{3}$$
$$3 + -1$$
$$= 2$$
$$-\frac{4}{3}$$

What is the result of the expression  $-3 \ll 2$ ?

~~A) -12~~

B) 12

C) -6

D) 6

$$\begin{array}{r} -3 * 2^2 \\ \text{---} \\ -3 * 4 \\ = -12 \end{array}$$

*\* by 2      times*

Explain the result of the following expression:  $\underbrace{-5 / 2 * 2}$  in C.

$$\begin{aligned} & -2 * 2 \\ & = -4 \end{aligned}$$

$\xrightarrow{/ *}$

- ◆ A) -5
- ~~◆ B) -4~~
- ◆ C) -6
- ◆ D) -2

What will be the result of  $a = \underbrace{2 * 3}_{6} + \underbrace{5 / 2}_{\frac{5}{2}}$  where a is an integer?

- A) 8
- B) 7
- C) 9
- D) 10

$$\begin{array}{r} 6 + 5 / 2 \\ \hline * / \\ 6 + 2 \\ = 8 \end{array}$$

$\frac{\text{int}}{\text{int}} = \text{int}$  +

What does the  $\wedge$  operator do when applied to  $6 \wedge 2$ ?

- A) Returns 4
- B) Returns 2
- C) Returns 8
- D) Returns 6

$$\begin{array}{rcl} 6 & \rightarrow & 110 \\ 2 & \rightarrow & \begin{array}{r} 010 \\ \hline 100 \end{array} \rightarrow (4)_{10} \end{array}$$

What is the result of  $!(-3 + 2)$ ?

- ❖ A) 0
- ❖ B) 1
- ❖ C) -1
- ❖ D) 2

$$\begin{array}{c} !(-1) \\ \downarrow \\ !(\text{True}) = \text{False} \end{array}$$

NOT → Return 0 When  
Value is non  
zero

\* All negative to positive numbers are True Except zero

What is the value of a after executing  $a *= 2 + 3 * 4$  if a is initially 5?

◆ A) 65

~~◆ B) 60 70~~

◆ C) 40

◆ D) 35

$$a = 5 ;$$

$$a *= 2 + \underbrace{3 * 4}$$

$$a *= 14$$

$$\hookrightarrow a = a * 14$$

$$a = 5 * 14$$

$$a = \frac{70}{=}$$

$*$  = → least precedence  
 $=$

What is the result of the following expression?

int a = 7;

int b = a-- + --a;

- ❖ A) 13
- ❖ B) 12
- ❖ C) 11
- ❖ D) 10

$$a = 7$$
$$b = a-- + --a$$

Handwritten annotations:

- A pink arrow points from the value 7 above to the variable  $a$  in the expression.
- The expression  $a--$  is circled in pink, with a pink arrow pointing from it to the value 6 written above it.
- The expression  $--a$  is circled in pink, with a pink arrow pointing from it to the value 5 written above it.
- A pink bracket groups the two circled terms:  $a-- + --a$ , with a pink arrow pointing from it to the result  $\underline{7 + 5}$ .
- A pink arrow points from the result  $\underline{7 + 5}$  to the final answer  $\Rightarrow 12$ .

What does the expression  $\underline{a} / b * 2$  evaluate to if  $a = 15$  and  $b = 4$ ?

◆ A) 7

$$15 / 4 * 2 \quad | * \rightarrow$$

~~◆ B) 6~~

$$3 * 2 \\ = 6$$

◆ C) 8

◆ D) 10

How does the `>>` operator behave with a negative number?  
Explain with an example using `-8 >> 2`.

- ~~◆ A)~~ It performs an arithmetic right shift, preserving the sign.
- ◆ B) It performs a logical right shift, filling with zeros.
- ◆ C) It performs a left shift operation.
- ◆ D) It inverts the bits.

What is the result of the following code snippet?

```
int a = 4;
```

```
int b = 2;
```

```
int result = (a ^ b) << 1; → 4 XOR 2 << 1
```

◆ A) 4

4 → 100

6 << 1

left shift → \* by 2

◆ B) 8

2 → 010  
110 → (6)<sub>10</sub>

12 (6×2)

◆ C) 6

◆ D) 12

What does the expression  $5 + 2 * \underline{(3 - 1)} / 2$  evaluate to in C?

~~◆ A) 7~~

◆ B) 6

◆ C) 8

◆ D) 10

$$5 + \underline{2 * 2} / 2$$

$$5 + 4 / 2$$

$$\Rightarrow 5 + 2 \Rightarrow 7$$

( )

\* | → L → R

+ -

What will be the output of the following code snippet?

```
int a = 3;
```

```
int b = a++ * --a;
```

$$\begin{aligned} a &= 3 \\ b &= \underbrace{a++}_{3} * \cancel{\underline{--a}} \\ &\quad 3 * 3 \\ &= 9 \end{aligned}$$

- ❖ A) 6
- ❖ B) 8
- ❖ C) 9
- ❖ D) 2

What is the result of the following expression in C?

int a = -5;

int b = 2;

int result = a / b \* b; →

$$\begin{array}{r} -5 \\ \diagup \\ 2 \\ \brace{ } \\ \times \end{array}$$

/ \* → Left to Right

◆ A) -5

$$-2 \times 2$$

◆ B) -10

$$= -4$$

◆ C) -4

◆ D) -6

Given the code snippet, what is the output?

```
int a = 3;
```

```
int b = a++ * ++a;
```

- ❖ A) 9
- ❖ B) 12
- ❖ C) 8
- ❖ D) ~~10~~ 15

$$\begin{aligned} a &= 3 \cancel{4} 5 \\ b &= a++ * \cancel{++a} \\ &\quad \downarrow \quad \downarrow \\ &= 3 * 5 \\ &= 15 \end{aligned}$$

What is the result of the bitwise operation  $7 \swarrow 2$  in C?

- A) 28
- B) 14
- C) 8
- D) 4

$$\Rightarrow 7 \times 2^2 \\ = 7 \times 2 \times 2 = \underline{\underline{28}}$$

\* by 2 for two times

What is the value of x after executing the following code?

```
int x = 15;  
x = x & 3;
```

$$\begin{array}{l} x = 15; \\ x = x \& 3 \end{array}$$

- A) 3
- B) 1
- C) 0
- D) 15

$$\begin{array}{rcl} 15 & \rightarrow & 1111 \\ 3 & \rightarrow & \frac{0011}{0011} \leftarrow (3)_{10} \end{array}$$

What is the result of  $10 \wedge 7$  in C?

~~◆ A) 13~~

◆ B) 5

◆ C) 3

◆ D) 17

$$\begin{array}{r} 10 \longrightarrow 1010 \\ 7 \longrightarrow \begin{array}{r} 0111 \\ \hline 1101 \end{array} \rightarrow (13)_{10} \end{array}$$

Given the following code, what is the value of result?

int a = 5;

int b = 3;

int result = (a++ + ++b) \* 2;

$$a=6 \quad b=4$$

~~◆ A)~~ 18

◆ B) 20

◆ C) 22

◆ D) 16

$$( \underbrace{a++ + ++b}_{(5+4)} ) * 2$$

$$9 * 2 = \underline{\underline{18}}$$

What does the expression  $!(-7)$  evaluate to in C?



- A) 0
- B) 1
- C) -1
- D) 2

$!(\text{True}) = \text{False}(0)$

What is the result of  $\underbrace{15 / 2 * 3}$ ?

/ \* → L→R

- ❖ A) 22
- ❖ B) 21
- ❖ C) 24
- ❖ D) 15

$$\begin{array}{r} 7 \times 3 \\ = 21 \end{array}$$

What will be the result of the following code?

```
int a = 4;
```

```
int result = a << 1 + 2;
```

◆ A) 12

◆ B) 6

◆ C) 8

◆ D) 32

$$4 \ll \underline{1} + 2$$

$$4 \ll 3$$

→ \* by 2 for 3 time

$$4 \times 2^3$$

$$\Rightarrow 4 \times 8 = 32$$

+ ← High

<< → low

What does  $x \wedge y$  do when  $x = 7$  and  $y = 4$ ?

~~◆ A)  $x = 3$~~

◆ B)  $x = 7$

◆ C)  $x = 11$

◆ D)  $x = 4$

$$x \wedge y \rightarrow x = x \wedge y$$

$$x = 7 \wedge 4$$

$$7 \rightarrow 0111$$

$$4 \rightarrow \begin{array}{r} 0100 \\ 0011 \\ \hline \end{array} \Rightarrow (3)_{10}$$

What is the result of  $!((\underbrace{4 + 2} \text{ NonZero}) * 3 - 12)$ ?

◆ A) 1

◆ B) 0 X

◆ C) -1

◆ D) 3

$$\begin{aligned} & \Rightarrow !((4+2)*3-12) \\ & \quad !(\underbrace{(6 * 3 - 12)}_{(18 - 12)}) \\ & \quad = !(+6) \\ & = !\text{True} = \text{False (0)} \end{aligned}$$

What will be the output of the following code?

```
int a = 5;
```

```
int result = a++ * 2 + --a;
```

◆ A) 12

◆ B) 14 ~~14~~ 15

◆ C) 11

◆ D) 10

$a = \cancel{5} 6 5$

$$\begin{aligned} r &= a++ * 2 + --a \\ &\quad \swarrow \quad \searrow \\ &= 5 * 2 + 5 \\ &= 10 + 5 \\ &= 15 \end{aligned}$$

What is the value of  $7 \mid 12$  in binary representation?

◆ A) 15

◆ B) 11

◆ C) 5

◆ D) 7

↗ bitwise

$$7 \rightarrow 0111$$

$$\begin{array}{r} 12 \\ \underline{\quad\quad\quad} \\ 0111 \end{array} \rightarrow (15)_{10}$$

What is the result of the following operation?

int x = -4;

int y = 5;

int result = x + y >> 2;

~~◆ A) 0~~

◆ B) -2

◆ C) -1

◆ D) 1

$$x = -4$$

$$y = 5$$

+ High

>> Low

$$n = \underbrace{x+y}_{-4+5} >> 2$$

$$-4+5 >> 2$$

$$1 >> 2$$

= 0 divide by

What will be the result of  $\underbrace{15 \%}_{\downarrow} 4 * 2$ ?

- A) 6
- B) 8
- C) 4
- D) 2

$$\begin{array}{r} 3 \times 2 \\ = 6 \end{array}$$

$$\begin{array}{r} 4 \sqrt{15} \\ \underline{-12} \\ \hline 3 \end{array}$$

Arithmatic  $\rightarrow$  Shift

Given the expression  $5 \ll 2 \& 3$ , what is the result?

~~◆ A) 0~~

◆ B) 3

◆ C) 8

◆ D) 5

$$5 \times 2^2 \& 3$$

$$20 \& 3$$

$$\Rightarrow 20 \rightarrow 10100$$

$$3 \rightarrow \& \frac{00011}{00000} \rightarrow 0$$

$\ll\ll$  high  
 $\&$  low

What is the result of  $\lceil -5 \rceil >> 1$ ?

$$\lceil -5 \rceil = -2$$

- ❖ A) -3
- ❖ B) -4
- ~~❖ C)~~ -2
- ❖ D) -1

What will be the result of the following code?

```
int a = 8;
```

```
int b = 2;
```

```
int result = a << b;
```

~~◆ A) 32~~

◆ B) 16

◆ C) 4

◆ D) 8

$$\begin{array}{rcl} 8 & \ll 2 \\ \backslash & & \backslash \\ \text{* by 2 for 3 times} & & 8 * 2^2 \\ & & = 8 * 4 \\ & & = 32 \end{array}$$

What is the result of the following operation?

int a = 7;

int result = a ^ (a & 3);

a ^ 3

~~◆ A) 4~~

◆ B) 3

◆ C) 7

◆ D) 5

$$\begin{array}{rcl} 7 & \rightarrow & 1\ 1\ 1 \\ 3 & \rightarrow & \underline{0\ 1\ 1} \\ & & \underline{0\ 1\ 1} \rightarrow 3 \end{array}$$

$$\begin{array}{rcl} 7 & \rightarrow & 1\ 1\ 1 \\ 3 & \rightarrow & \underline{0\ 1\ 1} \\ & & \underline{1\ 0\ 0} \rightarrow 4_{10} \end{array}$$

What does  $x \ll= 2$  do when  $x = 3$ ?

- ~~◆ A)~~ Shifts  $x$  left by 2 bits, resulting in 12.
- ◆ B) Shifts  $x$  right by 2 bits, resulting in 0.
- ◆ C) Multiplies  $x$  by 2, resulting in 6.
- ◆ D) Adds 2 to  $x$ , resulting in 5.

$$x = 3$$

$$x \ll= 2$$

↓

$$x = x \ll 2$$

$$x = 3 \ll 2$$

$$3 \times 2^2$$

\* by 2 for 2 times

$$x = \underline{12}$$

What is the result of the following code snippet?

```
int a = 6;  
int b = 3;  
int result = a / b * (b + 2);
```

$$a = 6, \quad b = 3$$

$$6 / 3 * (3 + 2)$$

$$6 / 3 * 5$$

$$= 2 * 5$$

$$= 10$$

- ❖ A) 18
- ❖ B) 12
- ~~❖ C) 10~~
- ❖ D) 9

( )  
\* )  
+ -

What does the expression !(6 ^ 6) evaluate to?

xOR →

$$! \underbrace{(0)}_{\text{input = equal}} = ! \text{false} = \text{True}(1)$$

↳ input = equal  
↳ false

- ❖ A) 1
- ❖ B) 0
- ❖ C) 6
- ❖ D) 12

divide by 2

What is the result of  $\underbrace{7 \gg 1}_{\text{divide by 2}} \& 1$ ?

- ❖ A) 0
- ~~❖ B) 1~~
- ❖ C) 2
- ❖ D) 3

3 & 1

3 → 0 1 1

1 →  $\frac{0 0 1}{0 0 1} \rightarrow (1)_{10}$

What is the result of  $\underline{-3} * 2 / 2$ ?

\* | → Left to right

◆ A) -3

$$-6 / 2 \Rightarrow -3$$

◆ B) -2

$$\downarrow \quad -\left(\frac{6}{2}\right)$$

◆ C) -6

◆ D) -4

$\wedge \rightarrow$  Left to Right

What is the value of  $5 \wedge 2 \wedge 1$ ?

- A) 4
- B) 2
- C) 3
- D) 6

$$\begin{array}{rcl} 5 & \rightarrow & 1 \ 0 \ 1 \\ 2 & \rightarrow & \overline{0 \ 1 \ 0} \\ 1 & \rightarrow & \overline{\overline{0 \ 0 \ 1}} \\ & & \underline{\underline{1 \ 1 \ 0}} \end{array} \rightarrow (4)_{10}$$

What is the result of  $5 \ll \underbrace{1 + 1}$ ?

+  
 $\ll$

- ❖ A) 11
- ❖ B) 10
- ❖ C) 8
- ~~❖ D) 20~~

$$\begin{aligned} & 5 \ll 2 \\ & \downarrow \quad \leftarrow \text{multiply by 2 for 2 times} \\ & 5 \times 2^2 \\ & = 5 \times 4 = \underline{\underline{20}} \end{aligned}$$

$\text{Alge} = \text{4 bits } \underline{\text{Unsigned}}$

What does `a & ~b` evaluate to when `a = 7` and `b = 3`?

- ~~◆ A) 4~~ ← Practically

◆ B) 5

◆ C) 6

◆ D) 2

e o

But

Practicality

a & ~b  
↓  
7 & ~3

`a=7, b=3 } Unsigned`

$\sim \leftarrow \text{high}$

$$3 \rightarrow 011$$

$$\sim 3 \rightarrow \boxed{100}$$

(4)<sub>10</sub>

$$\begin{array}{r} 7 \rightarrow 0 \underline{1} \underline{1} \\ 4 \rightarrow 4 \underline{1} 0 0 \\ \hline 0 0 0 \end{array}$$

$$3 \rightarrow 0 \dots 0 \underset{\brace{}}{0} 0 \underset{\brace{}}{1} 1$$

$$2's \text{ Complement} = \underbrace{1111\dots100}_{(\text{sign bit})} \leftarrow$$

What is the outcome of the following code?

```
int a = 10;
```

```
int b = 6;
```

```
int result = a % b + b * 2;
```

- ❖ A) 14
- ❖ B) 16
- ❖ C) 12
- ❖ D) 18

\* % → same (L→R)

$$\begin{array}{r} \boxed{10 \% 6 + 6 * 2} \\ \quad \quad \quad + \\ \boxed{4 + \boxed{6 * 2}} \\ \quad \quad \quad 4 + 12 \\ \Rightarrow \boxed{\underline{16}} \end{array}$$

$\overset{6 \sqrt{10}}{\cancel{6}}$