

DAY 69 • LIVE

2-3Q



MCA CET 2025

COMPUTER

NUMBER

SYSTEM

ADVANCED REVISION



INEXORABLE
MAH MCA CET 2025
FREE CRASH COURSE



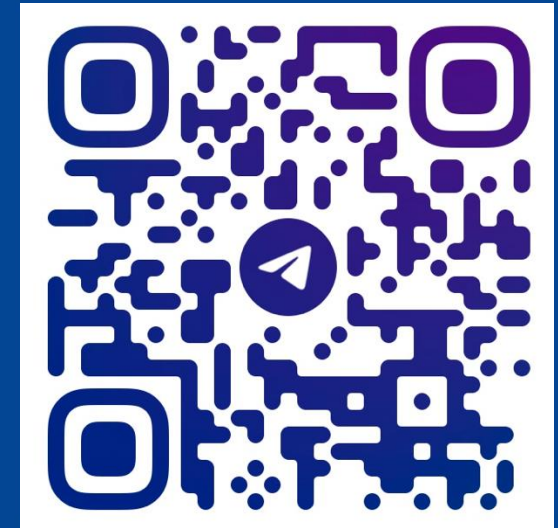


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Types of Numbers

8th - Logic/D.E.

10th - C. Prog.

1. Decimal Number $\Rightarrow (10)$

2. Binary Number $\cdot \text{---} (2)$

3. Octal Number $\cdot \text{---} (8)$

4. Hexadecimal Number $\cdot (16) \Rightarrow \text{---}$

$\swarrow$
0 15

0 - F

0	---	9	10	11	12	13	14	15
			A	B	C	D	E	F



Conversion of Number

Binary $\Rightarrow$ Dec
Dec $\Rightarrow$ Octal
Hexa $\Rightarrow$ Dec

$$32_{10} \Rightarrow (\underline{100000})_2$$

2	32	
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
		0 1



Fractional: $(10101100.1110000011\dots)_2$

Convert $(172.878)_{10}$ to binary $_{10}$

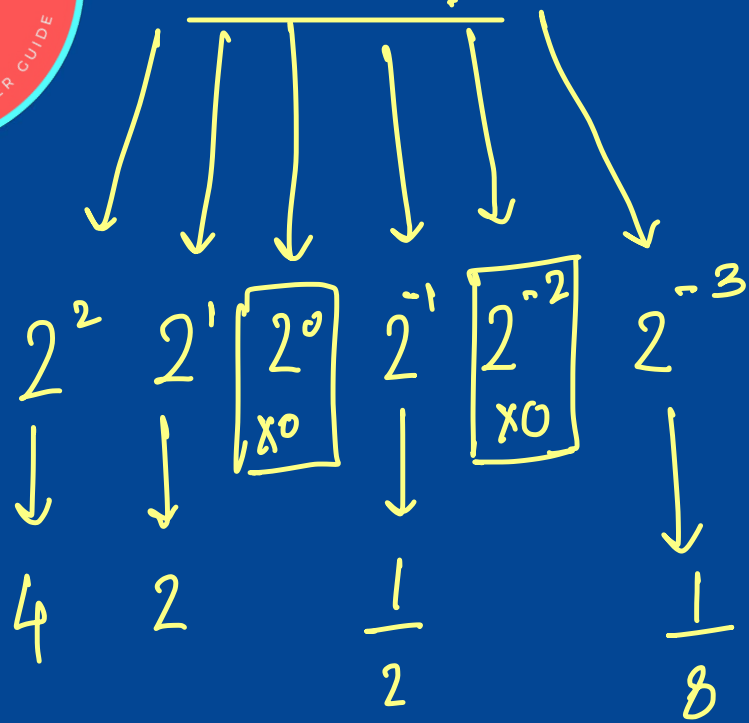
2	172	
2	86	0
2	43	0
2	21	1
2	10	1
2	5	0
2	2	1
2	1	0
	0	1

0.878×2	1.756	1
0.756×2	1.512	1
0.512×2	1.024	1
0.024×2	0.048	0
0.048×2	0.096	0
0.096×2	0.192	0
0.192×2	0.384	0
0.384×2	0.768	0
0.768×2	1.536	1
0.536×2	1.072	1



Fractional Binary $\rightarrow$ Decimal

110.101 to decimal



$$4 + 2 + 0.5 + 0.125 = 6.625_{10}$$



Binary Addition

$1+1=0$ plus take carry of 1 in next column

$0+0=0$

$1+0=1$

$0+1=1$

$1+1+1 = 1$ plus take carry of 1 in next column

$$\begin{array}{r} 1 \quad 1 \quad 1 \\ 1 \quad 0 \quad 1 \quad 1 \\ + 1 \quad 0 \quad 0 \quad 1 \\ \hline 1 \quad 0 \quad 1 \quad 0 \quad 0 \end{array}$$

$$\begin{array}{r} 1 \quad 1 \quad 1 \quad 1 \\ 1 \quad 0 \quad 1 \quad 1 \\ \quad 1 \quad 1 \quad 1 \\ \hline 1 \quad 0 \quad 0 \quad 1 \quad 0 \end{array}$$

1①
↓
Carry



Binary Subtraction

$$0 - 0 = 0$$

$$0 - 1 = 1 \text{ with a borrow from next column}$$

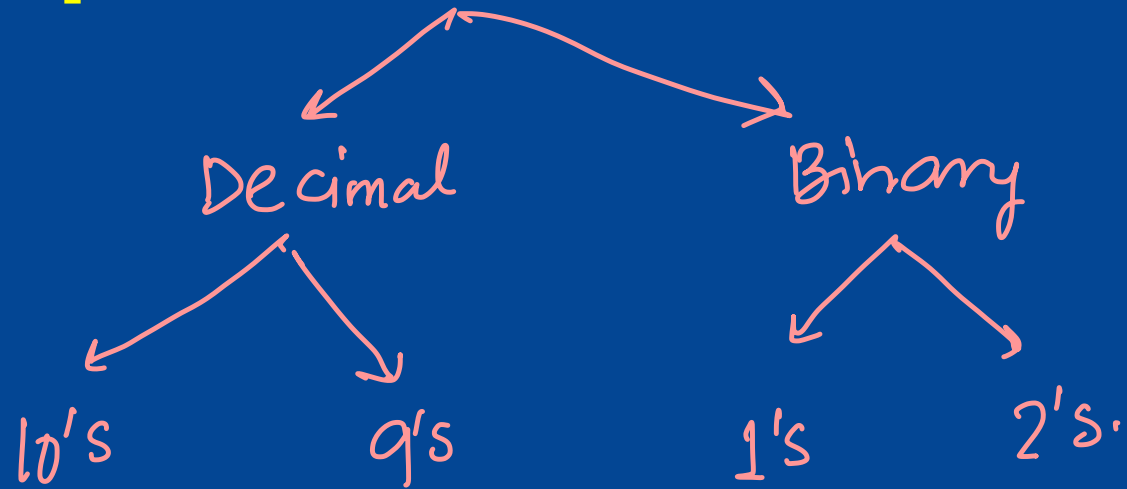
$$1 - 0 = 1$$

$$1 - 1 = 0$$

$$\begin{array}{r} 010 \\ 110 \\ \hline 001_2 \end{array} \Rightarrow \begin{array}{r} 6_{10} \\ -5_{10} \\ \hline 1_{10} \end{array}$$



Complement of a number





Complement with base n

Find the complement of 37_{10}

$\swarrow$ 10's
 $\searrow$ 9's

$$\begin{array}{r} 99 \\ - 37 \\ \hline \underline{62} \end{array} \Leftarrow 9's \text{ Complement}$$

$$\begin{aligned} & 10's \text{ Complement} \\ &= 9's \text{ complement} + 1 \\ &= 62 + 1 \\ &= \underline{63} \end{aligned}$$



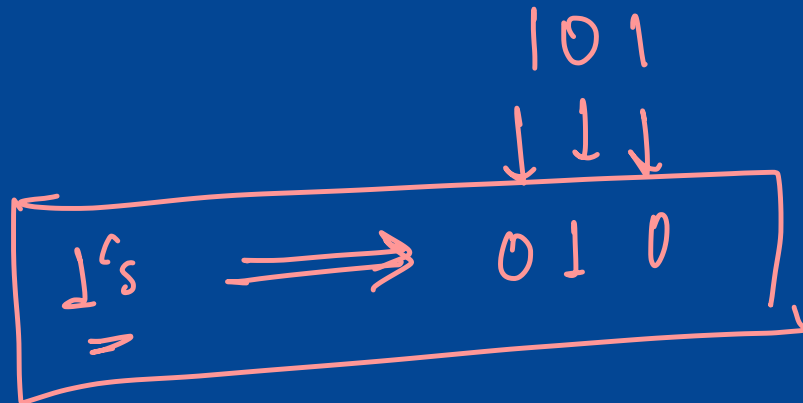
Binary Complement

Complement with base n

Find the complement of $\underline{101}_2$

$\nearrow$ 1's
 $\searrow$ 2's.

1's complement



2's complement

$\Rightarrow$ 1's complement + 1

$$= 010 + 1$$

$$= \underline{011} = 11_2$$



NOTE: If there's a carry overflow in 2's complement then we discard it.

Find 1's and 2's complement of 000000

• (a) 111111, 100000 ✗

✗ (b) 000000, 000000

✓ (c) 111111, 000000

✗ (d) 011111, 111111

1st $\Rightarrow$ 111111

additional
carry

↓

1	1	1	1	1	1
.	1	1	1	1	1

+ 1

1	0	0	0	0	0	0
---	---	---	---	---	---	---

x

0

0	0	0	0	0	0	0
---	---	---	---	---	---	---



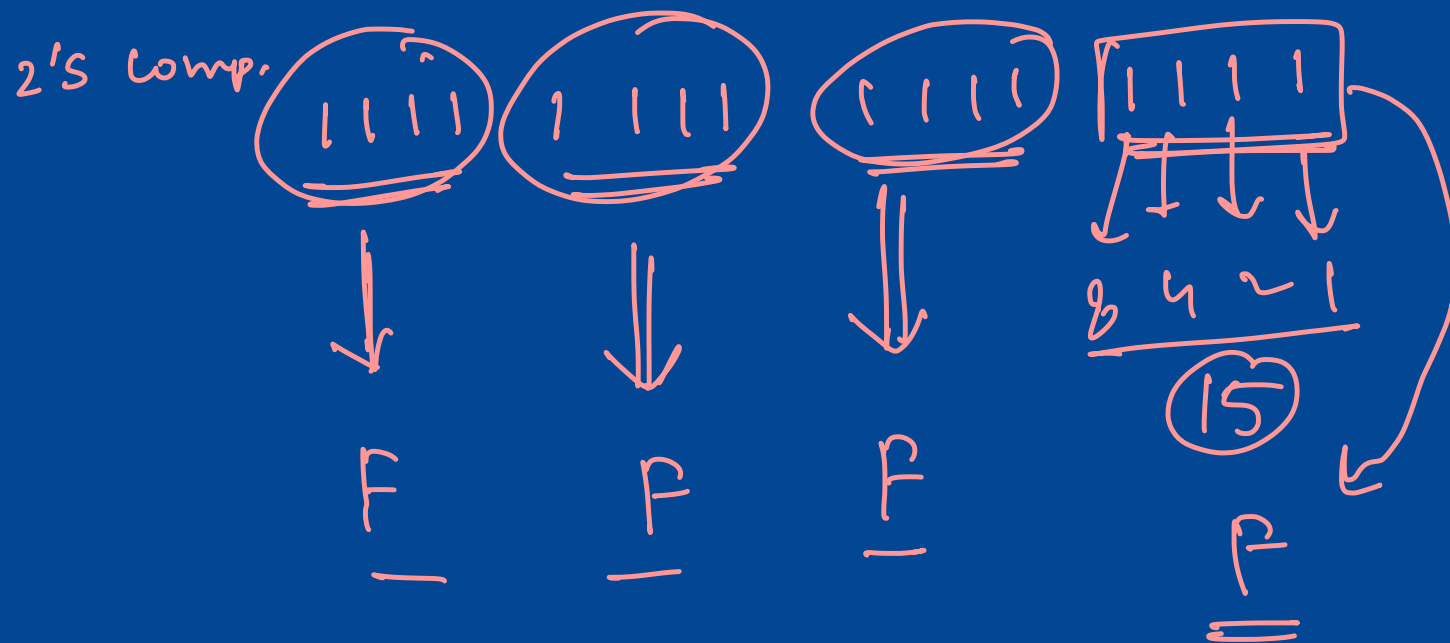
$$(1)_{10} \rightarrow (1)_2$$

Binary $\Rightarrow$ Hexa.

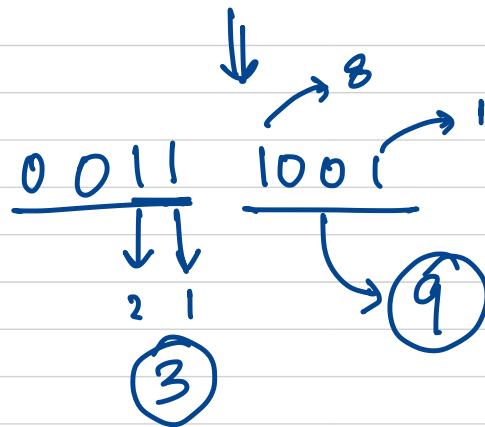
1_2 in 16 bit 0000 0000 0000 0001
1's comp $\Rightarrow$ 1111 1111 1111 1110

The 2's complement representation of -1 in 16 bit in hexadecimal form is

- ☒ A. FFFF
- B. FFFE
- C. ABCD
- D. BCDA



$$\underline{(111001)}_2 \Rightarrow (\underline{39})_{16}$$



Shortcut

Hexa $\rightleftharpoons$ Binary (4)

$$(AF)_{16} \Rightarrow (10101111)_2$$

10 1111

1010

(0-7)

Octal Shortcut Method. (3 bits)

Oct $\rightleftharpoons$ Binary

$$\begin{array}{c} \nearrow 4 \nearrow 1 \\ (\underline{10} \underline{111})_2 \Rightarrow (\quad 57 \quad)_8 \end{array}$$

$\Downarrow$
5 7

$$(27)_8 \Rightarrow (010111)_2$$

$\Downarrow \Downarrow$
010 111



2's complement of 11001100 is

(a) 01010100

(b) 00110011

(c) 01000100

☒ (d) 00110100

$$\begin{array}{r} 00110011 \\ + 1 \\ \hline 00110100 \end{array}$$



9's complement of 629 is

☒ (a) 370

(b) 371

(c) 361

(d) 325

$$\text{Comp} = 10\underline{\underline{\text{min}}}$$

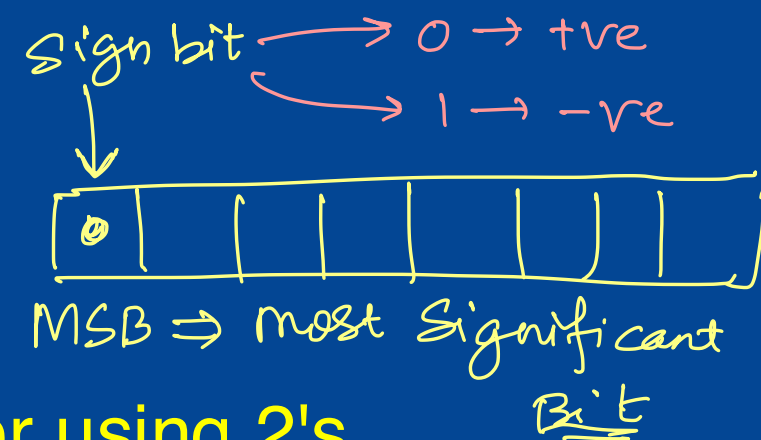
$$\begin{array}{r} 999 \\ 629 \\ \hline 370 \end{array} \quad \leftarrow 9\text{'s}$$

$$\begin{array}{r} 370 \\ + 1 \\ \hline 371 \end{array} \quad \leftarrow 10\underline{\underline{\text{'s}}}$$



2	50	
2	25	0
2	12	1
2	6	0
2	3	0
2	1	1
2	0	1

2	55	
2	27	1
2	13	1
2	6	1
2	3	0
2	1	1
2	0	1



Addition of + 50 and - 55 in 8 bit register using 2's complement will be

(a) 0 0000101

☒ (b) 1 1111011

(c) 1 1111010

(d) None of the above

$$50_2 = 110010$$

$$\downarrow$$

$$00110010$$

$$55_2 = 110111$$

$$\rightarrow 00110111$$

$$1's \Rightarrow 11001000$$

2's

$$\begin{array}{r} 11001000 \\ + 1 \\ \hline 11001001 \end{array} \leftarrow -55$$

$$50 \rightarrow 00110010$$

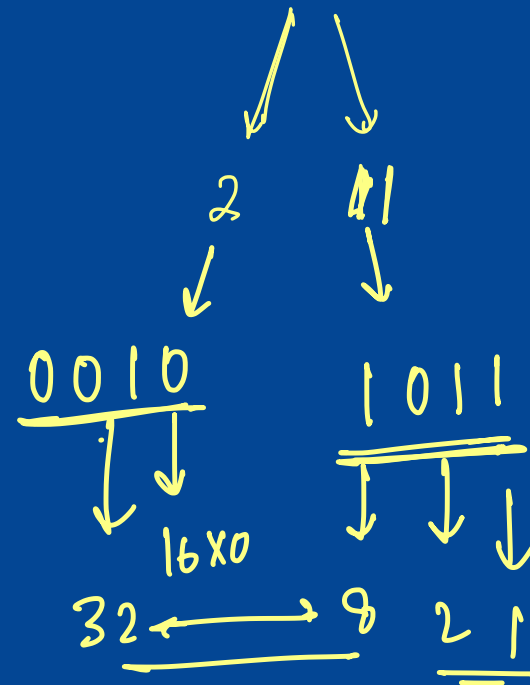
$$\rightarrow 55 \rightarrow 11001001$$

Result $\rightarrow$ 1 1111011 $\rightarrow$ 1's $\rightarrow +1 \rightarrow$ $00001001 = 9$ -5

$-ve$ $\leftarrow$

The decimal equivalent of Hexadecimal 2B is

- (a) 51
- ☒ (b) 43
- (c) 52
- (d) None



Perform Two's complement addition of two negative numbers $(11101)_2$ and $(11110)_2$

A. 00000

B. 00101

☒ C. 11011

D. 11111

↑
MSB

Overflow

$$\begin{array}{r} \boxed{1} \ 1 \ 1 \\ + \quad 1 \ 1 \ 1 \ 0 \ 1 \\ \hline \boxed{1} \ 1 \ 1 \ 0 \ 1 \ 1 \\ \hline \end{array}$$

discard

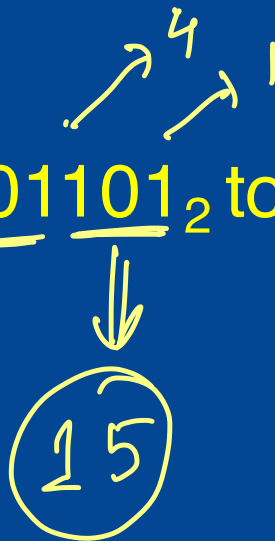
Convert 01101₂ to octal

A. 12

☒ B. 15

C. 13

D. 16





Hexa $\longleftrightarrow$ Binary $\longleftrightarrow$ Octal
(4 bits) (3 bits)

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Find the equivalent octal of $C1_{16}$

A. 201_8

✓ B. 301_8

C. 193_8

D. 302_8

A - 10

B - 11

C 1 (16)

↓ ↓
 12_{16} 1_{10}

1100 ← 12_{16} → 0001

011 | 000 | 001
↓ ↓ ↓
3 0 1

011 | 000 | 001
↓ ↓ ↓
3 0 1

11

$$\frac{1}{16} + \frac{1}{32}$$

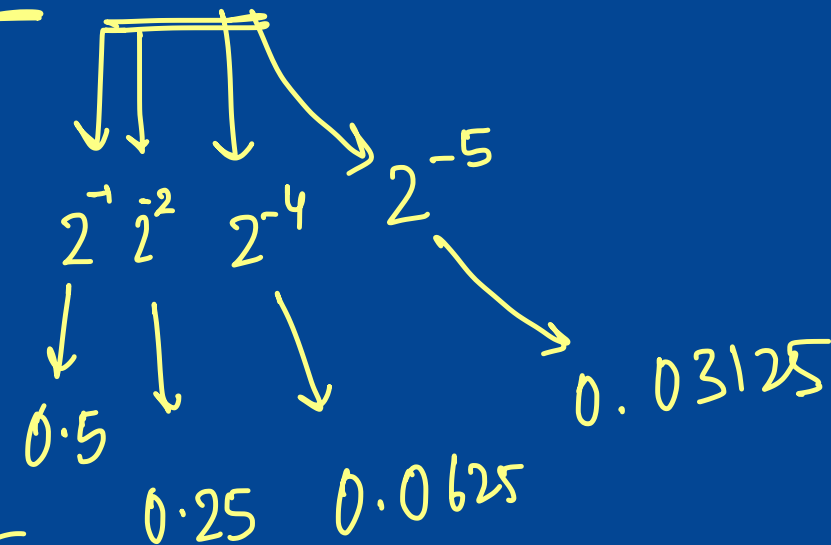
The decimal equivalent of binary 1011.11011 is

A. 11.84375

B. 10.8435 (X)

C. 11.74389

D. 10.74375 (X)



0.03125

0.50000

0.25000

0.06250

84375



[MCA CET 2025]

Represent the number 85.125 in the IEEE Standard 754 single-precision floating-point format.

- A. 0 01111111 010101001000000000000000
- B. 0 10000101 010101001000000000000000
- C. 0 01111101 010101001000000000000000
- ~~X~~ D. 1 10000101 010101001000000000000000

printing



85.125 $\rightarrow$ step 1 $\Rightarrow$ Convert to Binary.

$$85 = 1010101$$

$$0.125 = 001$$

$$85.125 = 1010101.001$$

$$= 1.010101001 \times 2^6$$

Scientific Notation.

$$\text{Biased Exponent} = 127 + 6$$

$$= 133_{10}$$

$$= (10001011)_2$$

$$\underline{01000101}$$

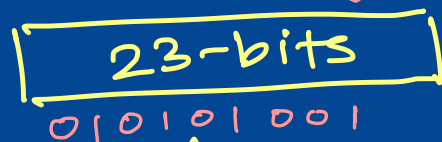
Note:
Add exponent
to biased
if no. is +ve
-ve $\Rightarrow$ sub.

IEEE 32 bit standard.



↑
Sign
(1 bit)

↑
exponent
(8 bit)



↑
mantissa
(23 bits)

↓
1 $\rightarrow$ -ve
0 $\rightarrow$ +ve

Ans:

0 01000101 01010100100000000000000000000000

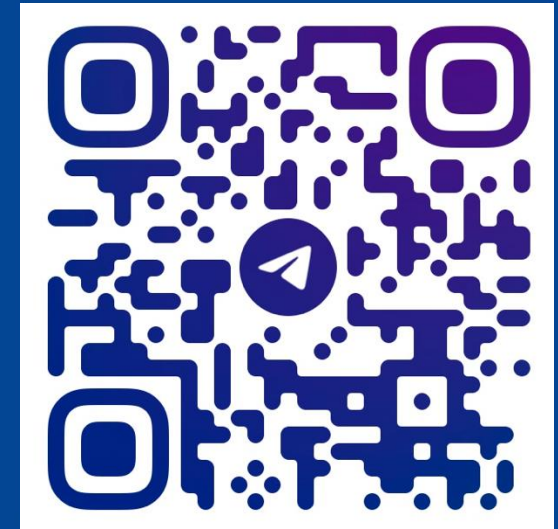


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