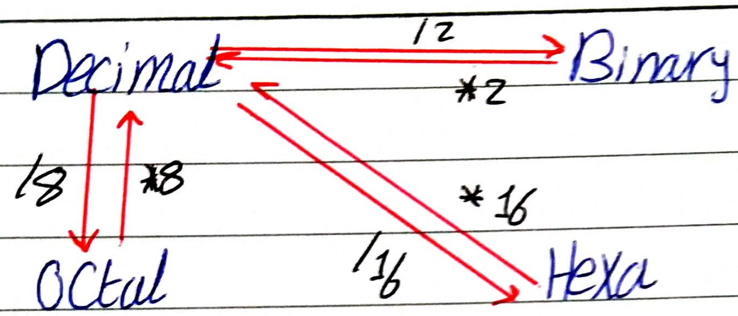
Date : 24/12/2020 Subject : circutes lec(2)

→ acadox

→ Cs 250

→ Digital logic circuites (OR) Google Book



add in Binary num:-

```
  0      1     1 ← carry    1 ← carry
  0+     0+    0 1           0 1+
 ---    ---    0 1+          0 1
  0      1    ----           0 1+
              [1]0          -----
                             1 1
```

[1] → extinsion Bit

لوصل carry عندك اكبر

→ result decimal ≤ 1 result

→ " " > 1 result decimal − 2 and carry → 1

Ex:- add $(11011)_2$, $(1101)_2$

```
  1 1 0 1 1
    1 1 0 1 +
  -----------
  1 0 1 0 0 0
```

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Subtraction in Binary num:-

Decimal	Binary	
$^{4}\not5\ \not3^{10}$	$(11)_2 \to 3$	$\not1\not0^{2}$ (borrow: 1)
$1\ 6$ −	$(10)_2$ − $\to 2$	1 −
$3\ 7$	$(01)_2 \to 1$	$0\ 1$

Ex:- $(101101)_2 - (000111)_2$ using direct substraction

$$\begin{array}{r} 101101 \\ -\ 000111 \\ \hline 100110 \end{array}$$

→ $-(3)_{10} - (5)_{10}$

→ $(+3)_{10} - (5)_{10}$ $A - B = A + (-B)$

2's complements:-

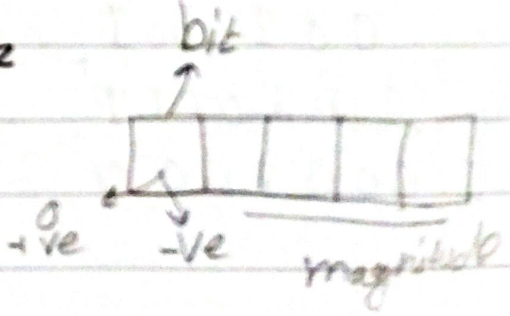
negative Binary num From +ve num

Ex:- $(9)_{10} \xrightarrow[\text{Binary}]{-ve} (\quad)_2$

↓

8 4 2 1

$(\boxed{1}\boxed{0}\boxed{0}\boxed{1})_2$



1's complement → (0110)

ones → zeros

zeros → ones

2's complement → (0110)

$(0001)^+$

$\boxed{1}\boxed{0}\boxed{1}\boxed{1}\boxed{1}$ ← $(0111)_2$

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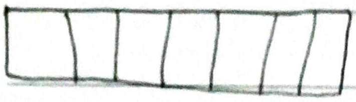
unsign



0 → 255

sign

0 → 127

Ex:- get negative num of $(1101101)_2$

1's 0010010

2's 0000001 +

+ve → 0

-ve → 1 → 10010011

Ex:- $(17)_{10}$ → 10001 (16 8 4 2 1)

+ $(9)_{10}$ → 01001 = 0011010

+ve ← $(26)_{10}$

extinsion: 0 (+ve) — sign: 0 (+ve)

Ex:- $(17)_{10}$ 10001

+ $(-9)_{10}$ 01001 → -ve بنجيب complement

$(8)_{10}$

1's complement 10110

2's 00001 +

$(-9)_{10} = (10111)_2$

extension, sign (+ve)

  0010001

-ve 1110111 +

neglected (1) 0001000

$(0001000)_2 = (8)_{10}$ (16 8 4 2 1)

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EX:- $-(17)_{10} \rightarrow 10001 \rightarrow$ 1's 01110

$+(9)_{10} \rightarrow 01001$ 2's 00001^{+}

$(-17)_{10} = (1(01111)_2$

1101111

0001001^{+}

$(1111000)_2 = (-8)_{10}$

0000111 ↓ verfication

0000001^{+}

$0001000 = (8)_{10}$

EX:- Find $(12)_{10} - (42)_{10} = (-30)_{10}$, $(-42)_{10}$

2	12	6	2	42	0
2	6	0	2	21-20	1
2	3	1	2	10	0
2	1	1	2	5-4	1
	0	0	2	2	0
			2	1	1
				0	0

$(01100)_2$

↳ $(010101 0)$ 1's (010101)

000001^{+}

$(-42)_{10} = 11(010110)_2$ −ve

$(12)_{10} = (0001100)_2^{+}$ +ve

$(-30)_{10} = (1110001 0)$

verfication $1s 0001110 1$

$(30)_{10} = (0001111 0)^{+1}$ 2's

EX:- $(-12)_{10} - (17)_{10} = (-29)_{10}$

$(-12)_{10} + (-17)_{10} = (-29)_{10}$

2	29-28	1
2	14	0
2	7	1
2	3	1
2	1	1

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Find:- $(12)_8 + (10)_8$, $(17)_8 + (12)_8$, $(17)_8 + (27)_8 + (16)_8$

* result = result decimal < 8

$(-8) + \alpha = \alpha$ $\alpha \neq 8$ (-8)

octal + (carry = 1)

$(12)_8 + (10)_8 = (22)_8$

$(17)_8 + (\overset{1}{1}2)_8 = (31)_8$

$(17)_8 + (27)_8 + (16)_8 = (64)_8$ result octal-16 = result decimal ≥ 16

carry = 2

EX:- $(12)_{16} + (10)_{16} = (22)_{16}$ Hexa result = result D < 16

$(1B)_{16} + (12)_{16} = (2D)_{16}$ H result - 16 = α $\alpha \neq 16$

$(17)_{16} + (27)_{16} + (1A)_{16} = [58]_{16}$ H result - 32 = result D $\neq 32$

carry = 1

carry = 2