

Numbering Systems

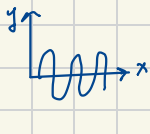
Data Types :

Numbers → Integers (5, 10, 1000, ...)
→ Floats (8.23, ...)

Characters (A, a, ?, Z, ...)

Pictures 

Video

Audio 

Numbering Systems:

decimal system (0-9)

Binary System (0-1) 0: 000
1: 001

octal system (0-7)

hexadecimal system (0-15)

$(56)_{10} \rightarrow (111000)_2$

$$\begin{array}{r} 28 \\ 2 \overline{) 56} \\ \underline{56} \\ 0 \end{array} \quad \begin{array}{r} 14 \\ 2 \overline{) 28} \\ \underline{28} \\ 0 \end{array} \quad \begin{array}{r} 7 \\ 2 \overline{) 14} \\ \underline{14} \\ 0 \end{array} \quad \begin{array}{r} 3 \\ 2 \overline{) 7} \\ \underline{6} \\ 1 \end{array} \quad \begin{array}{r} 1 \\ 2 \overline{) 3} \\ \underline{2} \\ 1 \end{array} \quad \begin{array}{r} 0 \\ 2 \overline{) 1} \\ \underline{0} \\ 1 \end{array}$$

من الباقي بقوله
من الباقي الباقي

التحقق:

$$\begin{array}{r} 1 \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \\ 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \end{array} \times = 32 + 16 + 8 + 0 + 0 + 0 = \boxed{56}$$

$(37)_{10} \rightarrow (45)_8$

$$\begin{array}{r} 4 \\ 8 \overline{) 37} \\ \underline{32} \\ 5 \end{array} \quad \begin{array}{r} 0 \\ 8 \overline{) 4} \\ \underline{0} \\ 4 \end{array}$$

تحقق:

$$\begin{array}{r} 4 \quad 5 \\ \times 1 \quad \times 0 \\ 8 \quad 8 \\ \hline 32 + 5 = 37 \end{array}$$

$$(46)_{10} \rightarrow (2E)_{16}$$

$$\begin{array}{r} 2 \\ 16 \overline{) 46} \\ \underline{32} \\ 14 \end{array}$$

$$\begin{array}{r} 0 \\ 16 \overline{) 2} \\ \underline{0} \\ 2 \end{array}$$

$$\begin{array}{r} 2 \quad E \\ 2 \quad 14 \\ \times \quad \times \\ \hline 16 \quad 16 \\ \hline 32 + 14 = 46 \end{array}$$

: تحقق

$$(33)_{10} \rightarrow (13)_5$$

$$\begin{array}{r} 6 \\ 5 \overline{) 33} \\ \underline{30} \\ 3 \end{array}$$

$$\begin{array}{r} 1 \\ 5 \overline{) 3} \\ \underline{5} \\ 1 \end{array}$$

$$\begin{array}{r} 0 \\ 5 \overline{) 1} \\ \underline{0} \\ 1 \end{array}$$

$$\overline{533}$$

$$\begin{array}{r} 1 \quad 1 \quad 3 \\ 5 \quad 5 \quad 5 \\ \hline 25 + 5 + 3 = 33 \end{array}$$

: تحقق

$$(34)_8 \rightarrow (11100)_2$$

$$\begin{array}{r} 3 \quad 4 \\ 8 \quad 8 \\ \hline 24 + 4 \end{array}$$

$$\begin{array}{r} 14 \\ 2 \overline{) 28} \\ \underline{28} \\ 0 \end{array}$$

$$\begin{array}{r} 7 \\ 2 \overline{) 14} \\ \underline{14} \\ 0 \end{array}$$

$$\begin{array}{r} 3 \\ 2 \overline{) 7} \\ \underline{6} \\ 1 \end{array}$$

$$\begin{array}{r} 1 \\ 2 \overline{) 3} \\ \underline{2} \\ 1 \end{array}$$

$$\begin{array}{r} 0 \\ 2 \overline{) 1} \\ \underline{0} \\ 1 \end{array}$$

: تحقق

$$(11100)_2 \rightarrow (34)_8 \rightarrow (28)_{10}$$

$$\begin{array}{r} 1 \quad 1 \quad 1 \quad 0 \quad 0 \\ 4 \quad 3 \quad 2 \quad 1 \quad 0 \\ 2 \quad 2 \quad 2 \quad 2 \quad 2 \\ \hline 16 + 8 + 4 + 0 + 0 = 28 \end{array}$$

$$\begin{array}{r} 3 \\ 8 \overline{) 24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 0 \\ 8 \overline{) 34} \\ \underline{32} \\ 2 \end{array}$$

$$(5 A B C 3 2 4 7) \rightarrow \begin{matrix} 1 \\ 8 \end{matrix}$$

صعب جداً

$$(5 A 7 B) \rightarrow (0101 \ 1010 \ 0111 \ 1011)_2$$

↑ 16
← 4
2
بالثنائي

إذا طلع أقل من 4 فإني
بشكل أرقام البس

لازم مضاعفات
2 (حجم البتات)

$$(5 5 1 7 3)_8$$

0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

$$(A 3 B 2 6 9) \rightarrow (5 0 7 3 \ 1 \ 1 \ 5 \ 1)_8$$

$$(1010 \ 0011 \ 0110 \ 0101 \ 0110 \ 1001)_2$$

للتحقق بخول من 8 ← 2 بعد 16 (4 د)
(3 د)

$$(36)_8 \xrightarrow{16+12+2} (132)_4 \xrightarrow{30+0} (50)_6$$

$$(36)_8 \xrightarrow{2^3} (011 \underline{110})_2$$

$$(30)_{10}$$

$$\begin{array}{r} 1 \quad 3 \quad 2 \\ 4^2 \quad 4^1 \quad 4^0 \\ \hline (6+12+2) = 30 \end{array}$$

$$\begin{array}{r} 5 \\ 6 \overline{) 30} \\ \underline{20} \\ 10 \end{array}$$

$$\begin{array}{r} 0 \\ 6 \overline{) 5} \\ \underline{0} \\ 5 \end{array}$$

$$\begin{array}{r} 47 \\ 10111 \\ 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \end{array}$$

$$135 \quad (10000111)$$

$$\begin{array}{l} 124 \\ 10000000 \rightarrow 128 \quad 2^7 \\ 0111111 \rightarrow 127 \\ 0111100 \rightarrow 124 \end{array}$$

القيمة
بشكل 3
أي ص 3
 $2^1 + 2^0 = 3 = 2 + 1$

Fraction:

$$(20.125)_{10} \xrightarrow{\text{بجاء الأرقام الصحيحة أولاً}} (10100 \cdot \frac{001}{2^1 2^2 2^3})_2$$

$$\begin{array}{l} 0.125 \times 2 = 0.25 \\ 0.25 \times 2 = 0.5 \\ 0.5 \times 2 = 1.0 \end{array}$$

بما أنه
الجزء الكسري

$$\begin{array}{r} (23.25)_{10} \\ 2 \\ 8 \overline{) 23} \\ \underline{16} \\ 7 \end{array}$$

$$(27.2)_8$$

$$8 \overline{) 23} \quad \frac{2}{2} \quad \frac{2}{2}$$

$$0.25 \times 8 = 2.0$$

$$\begin{array}{r} (27.2)_8 \\ 8 \overline{) 27} \\ \underline{16} \\ 11 \\ 8 \overline{) 11} \\ \underline{8} \\ 3 \end{array}$$

1100 .
 $(27.2)_{10}$
 010111.010
 11011
 X
 الصف
 مقع
 الك
 - الزففة

$()_{16}$
 0010111.0100
 $(17.4)_{16}$

$(5.2)_{10} \rightarrow (101.00110)_2$
 $0.2 \times 2 = 0.4$
 $0.4 \times 2 = 0.8$
 $0.8 \times 2 = 1.6$
 $0.6 \times 2 = 1.2$
 $0.2 \times 2 = 0.4$
 $(5.19)_{10}$

$(27.0625)_{10} \rightarrow ()_2 \rightarrow ()_8$
 $(11011.000100)_2 \rightarrow (33.04)_8$

$0.0625 \times 2 = 0.1250$
 $0.125 \times 2 = 0.25$
 $0.25 \times 2 = 0.5$
 $0.5 \times 2 = 1.00$

$\begin{array}{r} 13 \\ 2 \overline{) 27} \\ 26 \\ \hline 1 \end{array}$

P. 7

Ex: Q1:

$$b) (10000101)_2 \rightarrow (133)_{10}$$

$\begin{array}{cccccccc} 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \end{array}$
 $128 + 0 + 0 + 0 + 0 + 4 + 0 + 1 \rightarrow$

$$d) (01101001)_2 \rightarrow (105)_{10}$$

$\begin{array}{cccccccc} 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{array}$
 $0 + 64 + 32 + 0 + 8 + 0 + 0 + 1 = 105$

$$a) (00011110)_2 \rightarrow (30)_{10}$$

$\begin{array}{cccccccc} 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 \end{array}$
 $16 + 8 + 4 + 2 + 0 = 30$

Q2.

$$a) (1000)_2 = (8)_{10}$$

$\begin{array}{cccc} 2^3 & 2^2 & 2^1 & 2^0 \\ 1 & 0 & 0 & 0 \end{array}$

∴ False

$$c) (0010)_2 = (2)_{10}$$

$\begin{array}{cc} 2^1 & 2^0 \\ 0 & 1 \end{array}$

∴ False

$$d) (001)_2 = 1$$

$\begin{array}{cc} 2^1 & 2^0 \\ 0 & 1 \end{array}$

$$(1101)_2 = 13$$

$\begin{array}{cccc} 2^3 & 2^2 & 2^1 & 2^0 \\ 1 & 1 & 0 & 1 \end{array}$
 $8 + 4 + 0 + 1$

q > 13
False

$$b) (0111)_2 = (0111)_{10}$$

$$\downarrow$$

$$(7)_{10}$$

False

Q 10 :

$$a) (72)_8 \rightarrow (58)_{10}$$

$$\begin{array}{r} 7 \times 8^1 + 2 \times 8^0 \\ 56 + 2 = 58 \end{array}$$

$$c) (DEF)_{16} \rightarrow (3553)_{10}$$

$$\begin{array}{r} 13 \times 16^2 + 14 \times 16^1 + 15 \times 16^0 \\ 3328 + 224 + 15 = 3553 \end{array}$$

$$d) (11001)_8 \rightarrow (4609)_{10}$$

$$\begin{array}{r} 1 \times 8^4 + 1 \times 8^3 + 0 \times 8^2 + 0 \times 8^1 + 1 \times 8^0 \\ 4096 + 512 + 0 + 0 + 1 = 4609 \end{array}$$

$$e) (ACE)_{16} \rightarrow (2766)_{10}$$

$$\begin{array}{r} 10 \times 16^2 + 12 \times 16^1 + 14 \times 16^0 \\ 2560 + 192 + 14 = 2766 \end{array}$$

$$f) (1001)_{16} \rightarrow (4096)_{10}$$

$$\begin{array}{r} 1 \times 16^3 + 0 \times 16^2 + 0 \times 16^1 + 1 \times 16^0 \\ 4096 + 0 + 0 + 1 = 4097 \end{array}$$

$$g) (37.7)_8 \rightarrow (31.87)_{10}$$

$$\begin{array}{r} (0.11111111)_2 \\ 16 + 8 + 4 + 2 + 1 = 31 \\ \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128} + \frac{1}{256} = 0.875 \end{array}$$

$$\begin{array}{r} 0.87 \\ 8 \overline{) 70} \\ \underline{64} \\ 60 \\ \underline{56} \\ 60 \\ \underline{60} \\ 0 \end{array}$$

بحول مباشرة ←

$$h) (B2.F)_{16} \rightarrow (10110010.0010011)_2$$

$$0.15 \times 2 = 0.3$$

$$0.3 \times 2 = 0.6$$

$$0.6 \times 2 = 1.2$$

$$0.2 \times 2 = 0.4$$

$$0.4 \times 2 = 0.8$$

$$0.8 \times 2 = 1.6$$

$$0.6 \times 2 = 1.2$$

Q 3:

$$2 \times 256 = 512$$

d) $(400)_{10} \rightarrow (110010000)_2$

$$\begin{array}{r} 144 \\ \underline{128} \\ 16 \end{array}$$

$2^8 : 256$

1	0	0	0	0	0	0	0
2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1
1	1	0	0	1	0	0	0

e) $(547)_{10} \rightarrow (1000100011)_2$

$2^9 : 512$

1	0	0	0	0	0	0	0	0
2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1
1	0	0	0	1	0	0	0	1

$$\begin{array}{r} 547 \\ \underline{512} \\ 35 \\ \underline{32} \\ 3 \end{array}$$

h) $(B2.F)_{16}$

$(10110010.0010011)_2$

$0.15 \times 2 = 0.3$

$0.3 \times 2 = 0.6$

$0.6 \times 2 = 1.2$

$0.2 \times 2 = 0.4$

$0.4 \times 2 = 0.8$

$0.8 \times 2 = 1.6$

$0.6 \times 2 = 1.2$

$15 \times \frac{1}{16}$

X

$$\frac{8}{16} + \frac{4}{16} + \frac{2}{8} + \frac{1}{16}$$

Y

1	0	1	1	0	0	1	0	0	1	1
2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
1	0	1	1	0	0	1	0	0	1	1
2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	0	64	32	16	8	4	2	1	0	0
128	0	32	16	8	4	2	1	0	0	0
176	0	16	8	4	2	1	0	0	0	0

$$\begin{array}{r} 11 \quad 2 \\ \underline{16 \quad 16} \\ 176 + 2 \end{array} = 178$$

$$\frac{15}{16}$$

Q: 4

$$a) (26.75)_{10} \rightarrow (11010.11)_2$$

$$\begin{array}{r} 26 \\ -16 \\ \hline 10 \\ -8 \\ \hline 2 \end{array}$$

$$\begin{array}{ccccccc} & 4 & 3 & 2 & 1 & 0 & \\ 2 & 2 & 2 & 2 & 2 & & \\ 16 & 8 & 4 & 2 & 1 & 0 & 0 \\ \hline & 1 & 1 & 0 & 1 & 0 & \end{array}$$

$$\begin{aligned} 0.75 \times 2 &= 1.5 \\ 0.5 \times 2 &= 1.0 \end{aligned}$$

$$c) (78.875)_{10} \rightarrow (1001110.111)_2$$

$$\begin{array}{r} 78 \\ -64 \\ \hline 14 \\ -8 \\ \hline 6 \end{array}$$

$$64 \quad 1001110$$

$$\begin{aligned} 0.875 \times 2 &= 1.75 \\ 0.75 \times 2 &= 1.5 \\ 0.5 \times 2 &= 1.0 \end{aligned}$$

$$Q: 6) (0.4)_{10} \rightarrow (0.01100)_2$$

$$\begin{aligned} 0.4 \times 2 &= 0.8 \\ 0.8 \times 2 &= 1.6 \\ 0.6 \times 2 &= 1.2 \\ 0.2 \times 2 &= 0.4 \\ 0.4 \times 2 &= 0.8 \end{aligned}$$

$$(26)_7 \rightarrow (24)_8$$

error

$$\begin{array}{cc} 2 & 6 \\ 7 & 7 \\ \hline 14 & 12 \end{array}$$

$$\rightarrow (20)_{10}$$

$$\begin{array}{r} 2 \\ 8 \overline{) 20} \\ \underline{16} \\ 4 \end{array}$$

$$\begin{array}{r} 0 \\ 8 \overline{) 20} \\ \underline{16} \\ 4 \end{array}$$

Binary operation

$$\begin{array}{r} 5 \quad 101 \\ 6 \quad 110 + \\ \hline 11 \quad 1011 \end{array}$$

$$\begin{array}{r} 13 \quad 111 \\ 3 \quad 110 \\ \hline 0011 \\ 16 \quad 10000 \end{array}$$

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

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

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

$$\begin{array}{r} 1 + \\ 1 + \\ \hline 10 \end{array}$$

$$\begin{array}{r} 1 + \\ 1 + \\ \hline 11 \end{array}$$

$$\begin{array}{r} 111 \\ 111 + \\ \hline 1110 \end{array}$$

عوضه 1111

$$\begin{array}{r} +0 \quad 101 \\ -1 \quad 101 \end{array} \rightarrow \text{بجای 0 به جای 1 و برعکس}$$

two's complement

$$1101 \rightarrow -3$$

$$00000110 \rightarrow +6$$

$$\Rightarrow \text{CPL} = 1101 \quad -3$$

$$\begin{array}{r} 10000000 \text{ و } 00010000 \\ 1 + \\ \hline 0011 = +3 \end{array}$$

$$\begin{array}{r} 0011 +3 \\ 1100 \\ \hline 1 + \\ 1101 = -3 \end{array}$$

$$\begin{array}{r} 101110 \\ 010001 \\ \hline 1 + \\ 010010 \Rightarrow +18 \end{array}$$

Using two's complement with 8-bits solve!

$$(36)_8 - (34)_6 = (\quad)_4$$

$(36)_8 \rightarrow 011110$
 $(34)_6 \rightarrow 0110$
 $18 + 4 = (22)_{10}$
 $00010110 + 22$
 11101001
 $1+$
 $11101010 - 22$

$$00011110$$

$$11101010 +$$

$$\times 00010000 = +8$$

$$0020$$

لو طلع انا ده زي (110111)₂ = (23)₄ والسرير

$$(2A)_{16} - (34)_7 = (\quad)_{10}$$

$(2A)_{16} \rightarrow 00101010$
 $(34)_7 \rightarrow 00011001$
 $21 + 4 = (25)_{10}$
 $32 \ 16 \ 8 \ 4 \ 2 \ 1$
 $(000 \ 1 \ 1 \ 001)_2$
 11100110
 $1+$
 $11100111 - 25$

$$111111$$

$$00101010$$

$$11100111 +$$

$$\times 00010001 \Rightarrow +17$$

$$(78)_9 - (3B)_{16} = (\quad)_8$$

$(78)_9 \rightarrow 01111000$
 $(3B)_{16} \rightarrow 00111011$
 $63 + 8 = (71)_{10}$
 $64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1$
 1000111
 01000111

$$01000111$$

$$11000101 +$$

$$\times 00011000 = (12)_{10}$$

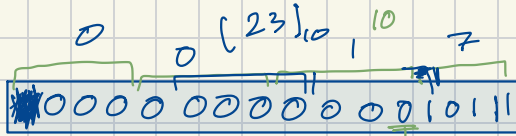
$$014$$

Data Representation

integers (16 bit)

floats/doubles

characters



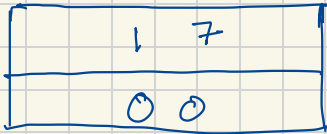
$$\begin{array}{cccccccccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \hline 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}$$

(23)₁₀

x 1000
(two's comp)

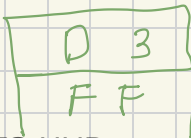
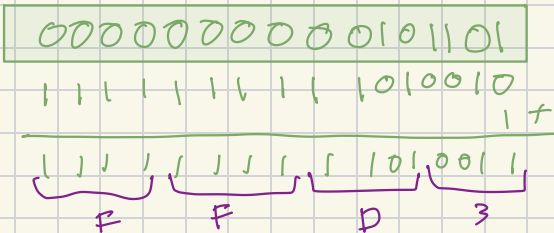
من الذاكرة للذاكرة

Memory



$$(0017)_{16} \rightarrow (0000\ 0000\ 0001\ 0111)_2 \rightarrow (23)_{10}$$

$$(-45)_{10} \rightarrow \text{mem}$$



بجدول
two's comp

$$\begin{array}{c} 2^{15} \\ \uparrow \\ 0 \\ \downarrow \\ 2^{15} \\ \sim 2 \end{array}$$

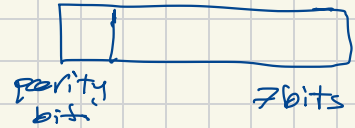
Characters
ASCII 7bit

A → 65

a → 97

بیت 7
بیت 6
بیت 5
بیت 4
بیت 3
بیت 2
بیت 1
بیت 0
127

Unicode (16 bit)



c → (99)₁₀
↓
01100011

error detection
تأیید

63

even parity
(عدد الواح زوجي)
0
odd parity
(عدد الواح فردي)
1

11100011 → E 3

E → odd parity

(69)₁₀

01000101

45

عدد الواح الفردي
وهو طلب 1 في كل
صف

Floating Point Representation

-22.25

10110.01

$0.25 \times 2 = 0.5$

$0.5 \times 2 = 1.0$

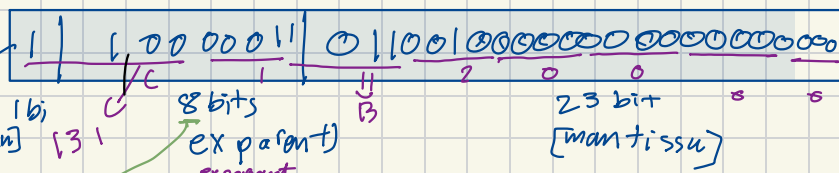
1.011001×2^4

(scientific notation)

32

255

$2^8 \rightarrow 256$
 $127 \rightarrow 0$
 $0 \rightarrow 255$



00
00
B2
C1

(0.0625)₁₀

$(00.0001)_2$

$\rightarrow 00001.0 \times 2^4$

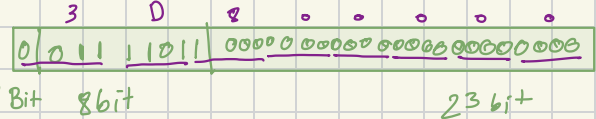
$0.0625 \times 2 = 0.125$

$0.125 \times 2 = 0.25$

$0.25 \times 2 = 0.5$

$0.5 \times 2 = 1.0$

123
 128 64 32 16 8 4 2 1
 01 1 1 0 1 1



00
00
80
3D

Q: 7:

$$(b) \begin{array}{r} 11010011 \\ 01010110^+ \\ \hline 100101001 \end{array}$$

$$\begin{array}{r} 10010011 \\ 0111001^+ \\ \hline 101001100 \end{array}$$

$$(c) \begin{array}{r} 11111110 \\ 1110101^+ \\ \hline 11110111 \end{array}$$

Q: 8:

$$(1) (-32)_{10} \\ \begin{array}{r} 00100000 \\ 11011111 \\ \hline 1^+ \\ (11100000)_2 = -32 \end{array}$$

$$(2) (13)_{10} \\ 00001100$$

$$(5) (36)_{10} \\ 00100100 \\ (6) (-23)_{10} \\ \begin{array}{r} 00010111 \\ 1101000 \\ \hline 1^+ \\ (1101001) \end{array}$$

Q: 9:

$$(a) (01111111)_2 - (76)_{10} = \boxed{51}$$

$$\begin{array}{r} 01001100 \\ 10110011 \\ \hline 1^+ \\ 10110100 \end{array}$$

$$\begin{array}{r} 11111111 \\ 01111111 \\ 10110100^+ \\ \hline X00110011 \\ 321621 = 51 \end{array}$$

$$(d) (00001111)_2 - (35)_{10} = \boxed{-20}$$

$$\begin{array}{r} 001000011 \\ 11011100 \\ \hline 1^+ \\ 11011101 \end{array}$$

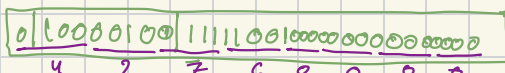
$$\begin{array}{r} 11111111 \\ 00001111 \\ 11011101^+ \\ \hline 11101100 \\ 60010011 \\ \hline 1^+ \\ 00010100 \\ 168421 = 20 \end{array}$$

(d) 63.125_{10}

$$0.125 \times 2 = 0.25$$

$$0.25 \times 2 = 0.5$$

$$0.5 \times 2 = 1.0$$



$\odot \leftarrow 127$
 $\begin{array}{r} 5+ \\ \hline 132 \\ 128- \\ \hline 4 \end{array}$

00
80
70
42

Ca

$$\begin{array}{r} C: \underline{11000011} \\ a: \underline{11100001} \\ \hline 94 \quad 81 \end{array}$$

C	3
E	1

$A \rightarrow 65$
 $C \rightarrow 67$
 $a \rightarrow 97$

64	-
33	
32	-
1	

(a) d' using odd parity.

$$\begin{array}{r} 100 \\ 64- \\ \hline 36 \\ 32- \\ \hline 4 \end{array}$$

$$\underline{01100100} \Rightarrow$$

64

$$(b) \quad (-28)_{10}$$

[illegible]

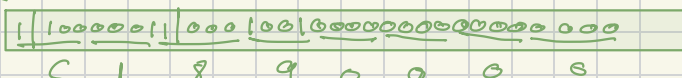
E	Y
F	F

$$(C) (-17.125)_{10} \Rightarrow (010001.001)_2 \Rightarrow 01.0001001 \times 2^4$$

010001 $\leftarrow 0.125 \times 2 = 0.25$

$$0.25 \times 2 = 0.5$$

$$0.5 \times 2 = 1.0$$



6	0
6	0
8	9

Q 2: Using two's complement with 8-bits solve!

$$(57)_9 - (23)_4 = (\quad 105 \quad)_6$$

q' q

$$45 + 7 = (52)_{10}$$

00110100

41

$$\begin{array}{r} 52 \\ - 32 \\ \hline 20 \\ - 20 \\ \hline 0 \\ - 15 \\ \hline 4 \end{array}$$



8 2 1

00001011

1110100

$$\begin{array}{r} 1110100 \\ + \\ 1110101 \\ \hline 11110101 \end{array}$$

$$\begin{array}{r} 11110100 \\ + \\ 1110101 \\ \hline 111101001 \end{array}$$

$$41 = 32 + 8 + 1$$

$$\begin{array}{r} 6 \\ 6 \overline{) 41} \\ \underline{36} \\ 5 \end{array}$$

$$\begin{array}{r} 5 \frac{1}{6} \\ 6 \overline{) 5} \\ \underline{6} \\ 0 \end{array}$$

$$\begin{array}{r} 6 \overline{) 1} \\ \underline{6} \\ 1 \end{array}$$

Q 3: Given the following representation in memory what are the decimal value:

float

00
00
41
C2

128 132

1	1000010	0100001	0000000000000000
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$$1.100001 \times 2^5 = -48.25$$

110000.01

32 16 8 4 2 1

1/4

integer

Do
FF

$$\begin{array}{r} 11111111010000 \\ 0000000600101111 \\ \hline 0600000000110000 \\ 32 16 8 4 2 1 \end{array}$$

-48