

It's strictly prohibited to use the calculator. (يُمنع منعاً باتاً استخدام الآلة الحاسبة)
For exercise 1 and 2 answer directly on the provided exam document.

Exercise 1 (7 pts): Convert the following numbers between the specified numeral systems.
(0,25*28 pt)

Decimal (10)	Binary (2)	Octal (8)	Hexadecimal (16)	X	Base (X)
121	1111001	171	79	3	11111
15,0625	1111,0001	71,1	F,1	4	33,01
41,25	101001,01	51,2	29,4	5	131,11
59	111011	73	3B	6	135
2607	101000101111	5057	A2F	7	10413
37	100101	171	25	8	45
41	101101	55	2D	9	45

Exercise 2 (7 pts):

A. Determine the Decimal, Sign-and- Absolute Value (SVA), One's Complement (1'C), and Two's Complement (2'C) representations for the following cases. (0,25*4 pt)

Decimal	VA	SVA	1'C	2'Complement
+28	00011100	00011100	00011100	00011100
-0	00000000	10000000	11111111	00000000
-127	01111111	11111111	10000000	10000001
-128	10000000	can't represent it	can't represent it	10000000

B. Provide the IEEE 754-32 representation of the number X (given in the first row of the table), and determine the corresponding decimal values (Y) for the representations given in the second row. (1,5*2 pt)

Decimal (10)	IEEE 754 32 bits		
	S	E	Mantissa
X= +27,125	0	10000011	101100100000000000000000
Y= -10,5	1	10000010	010100000000000000000000

Exercise 3 (6 pts)

1- Truth table of function F: $F(x,y,z) = x \oplus (y+z)$. (1pt)

2- 1st Canonical Form of F :

$$F(x,y,z) = \bar{X} \bar{Y} Z + X \bar{Y} \bar{z} + \bar{X}YZ + X\bar{Y} \bar{z} \quad (1pt)$$

2nd Canonical Form of F:

$$F(x,y,z) = (X+Y+Z) (\bar{X}+Y+\bar{z}) (\bar{X}+\bar{Y}+Z) (\bar{X}+\bar{Y}+\bar{z}) \quad (1pt)$$

3- Simplification of F using the Karnaugh table: (1pt)

x \ yz	00	01	11	10
0	0	1	1	1
1	1	0	0	0

X	Y	Z	Y+Z	F
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	1
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	0

$$F(x,y,z) = \bar{X}Y + \bar{X}Z + X\bar{Y}\bar{z} \quad (1pt)$$

4- Logigram of the Function F: (1pt)

