FIT1047

SUPPLEMENTARY WORKSHEET -02

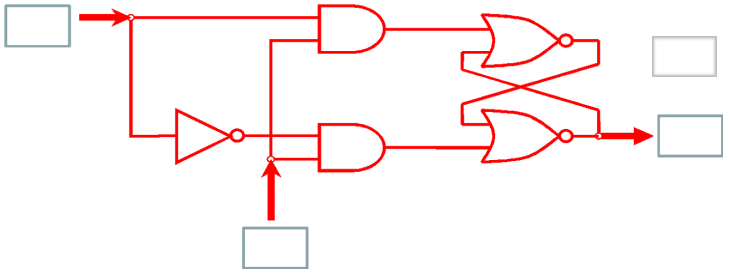
WEEK 03

Task:

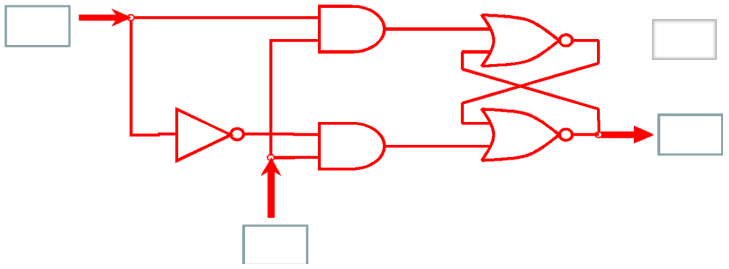
Consider the D flip-flop presented below.

1.

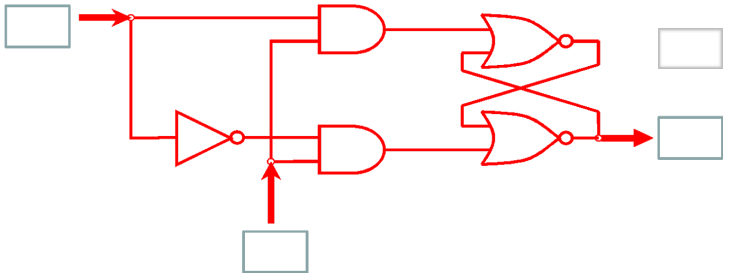
A) Write in each box the value at that point (e.g., 0 or 1) for the inputs control=1, and then data-in=0.



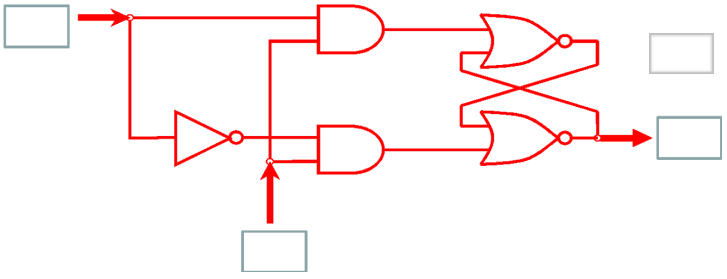
B) Followed by control = 1, and then data-in = 1



C) Followed by control = 0, and then data-in = 1



D) Followed by control = 0, and then data-in = 0



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2. Trace the following programs and determine the value of Z.

a.

```
          Load     X
          Add      Y
          Store    Z
          Halt
X,        DEC      42
Y,        DEC      4
Z,        DEC      0
```

b.

```
Load      X
Add       Y
Store     Z
Halt
X,        DEC      7
Y,        DEC      -11
Z,        DEC      5
```

3. Write a program in MARIE to add three numbers.

4. Write a program in MERIE to add three numbers using subroutine (call the subroutine addThree).

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5. Write a program to find greatest number from two numbers.

6. Give one reason why signed integer arithmetic is not suitable for computation of 3D graphics.

7. Draw a combinational circuit for the following Boolean function using only NOT, OR, and AND gates: $F(x1, x2, x3) = x_1 \neg x_2 \neg x_3 + x_1 x_2 \neg x_3 + \neg x_1 x_2 \neg x_3$

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8. A 16-bit word in memory contains two 7-bit ASCII characters and one additional:
   a. even parity bit for each character. The parity bit is the right-most bit.

      i) If you find 01101000 10001110. Would this be a valid representation of two characters?

      ii) Which two characters are encoded in 10001101 01101010?

ASCII Hexadecimal	ASCII Binary (7-bit)	Character Value
030	0110000	0
031	0110001	1
032	0110010	2
033	0110011	3
034	0110100	4
035	0110101	5
036	0110110	6
037	0110111	7
038	0111000	8
039	0111001	9
041	1000001	A
042	1000010	B
043	1000011	C
044	1000100	D
045	1000101	E
046	1000110	F
047	1000111	G
048	1001000	H

   b. odd parity bit for each character. The parity bit is the left-most bit.

      i) If you find 11000111 11000001 01000011. Would this be a valid representation of three characters?

      ii) Which three characters are encoded in 11001000 0111000 1110000?

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[Prepared by Haidar Al-Khalidi]