Started on	Thursday, 1 December 2022, 5:38 PM
State	Finished
Completed on	Thursday, 1 December 2022, 5:53 PM
Time taken	15 mins 3 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Which MARIE instruction is being carried out by the microoperations that follow?

$MAR \leftarrow X$

$MBR \leftarrow M[MAR]$

$AC \leftarrow AC - MBR$

Select one:

- a. Jump X
- b. Load X
- c. Store X
- ○ d. Subt X ✔
- e. Don't know/No answer

The correct answer is: Subt X

Question **2**

Correct

Mark 1.00 out of 1.00

What is the difference in operation between a LOAD x and a LOADI x instruction?

Select one:

- a. The LOAD loads the value at address x to the AC; the LOADI loads the value x to the AC
- b. There is no difference if x is the same
- c. Don't know/No answer
- ○ d. The LOAD loads the value at address x to the AC; the LOADI loads the value found in the location addressed by the value in x to the AC ✔
- e. LOAD loads the value x to the AC; LOADI loads the value found at x to the AC

Your answer is correct.

The correct answer is: The LOAD loads the value at address x to the AC; the LOADI loads the value found in the location addressed by the value in x to the AC

Which of the following equations correctly reflects the truth table shown below? A, B and C are inputs and F is the output.

| A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Select one:
- a.   Don't know/no answer
- b.   F = (A'B'C + A'BC' + AB'C + A'B'C + ABC)'
- c.   None of these expressions
- d.   F = A'B'C' + A'BC + AB'C' + ABC'
- e.   F = A'B'C ' + A'B'C + AB'C' + ABC'
- f.   F = A'B'C + A'BC' + AB'C + ABC   ✔

The F output is given as a sum-of-products expression where each product (AND) should correspond to a row where F = 1.

The correct answer is: F = A'B'C + A'BC' + AB'C + ABC

Given the logic circuit and table below (with output Q), which line of the table does *not* correspond to the behaviour of the logic circuit?
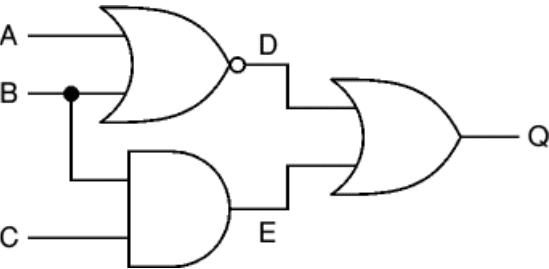
Row	A	B	C	Q
1	0	0	0	1
2	0	0	1	1
3	0	1	0	1
4	0	1	1	1
5	1	0	0	0
6	1	0	1	0
7	1	1	0	0
8	1	1	1	1

Select one:

- a. Row 8
- b. Row 2
- c. Row 4
- d. Row 3 ✔
- e. Row 1
- f. Don't know/no answer
- g. Row 6
- h. Row 7
- i. Row 5
- j. All rows are correct

Row 3 is in error as the output of the NOR-gate (D) and AND-gate (E) are zero, leading to an output of the OR-gate (Q) of zero.

The correct answer is: Row 3

Which of the following pair of values usually make up an instruction in a simple instruction set?

Select one:

- ○ a. OpCode, Address ✔
- ○ b. Don't know/No answer
- ○ c. Operand, Address
- ○ d. Operation, FDE
- ○ e. Operation, Instruction Length

Your answer is correct.

The correct answer is: OpCode, Address

Consider the next MARIE instructions: Load, Add, Store, Subt, Input and Output. Which of the following MARIE registers is not always used in the FDE cycle of the above instructions?

Select one:

- ○ a. InREG   ✔ Not used for anything but input (Input instruction)

- ○ b. MAR
- ○ c. AC
- ○ d. PC

The correct answer is: InREG

Which of the following statements is *the most accurate* description for the sum-of-products expression below?

F = A'BC + ABC' + AB'C'

Select one:

- ○ a. Don't know/no answer.
- ○ b. The truth table has two rows where F = 1 and no zeros need to be in the inputs to return one.
- ○ c. The truth table has three rows where F = 1 and B must be one to return one.
- ○ d. The truth table has four rows where F = 1 and no zeros need to be in the inputs to return one.
- ○ e. The truth table has three rows where F = 1 and no zeros need to be in the inputs to return one.
- ● f. The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one. ✔

Your answer is correct.

The number of OR-ed terms above specifies the number of input cases that lead to a true expression (rows of truth table that give F = 1). Each of the inverted variables shows where the input needs to be zero for that input case.

The correct answer is: The truth table has three rows where F = 1 and at least one zero must be in the inputs to return one.

Consider the following MARIE program. What is the outcome of the program?

```
            Clear
            Add X
            Store Sum
LoopC,      Skipcond 800
            Jump LoopEnd
Loop,       Output
            Subt Y
            Jump LoopC
LoopEnd,    Halt
X,          Dec 10
Y,          Dec 2
Sum,        Dec 0
```

Select one:

- a. The program will compute the expression 10+8+6+4+2 (i.e., 30) before ending.
- b. The program will compute the expression 10, 9, 8, 7 and 6 before ending.
- c. The program will output 2 for five consecutive times before ending.
- d. The program will output the decimal numbers 10, 8, 6, 4 and 2 before ending. ✔
- e. The program will output the decimal numbers 10, 8, 6, 4, 2 and 0 before ending.

This program executes a "Loop" using the Skipcond instruction. In this case, the condition in Skipcond is set to 10 and so IR[11-10] is 10. Thus, if AC>0 then PC will become PC+1 and the execution will continue from "Loop" . Otherwise, the execution will continue from "LoopEnd". Initially (after the execution of the first two statements) the AC will be 10 (>0) and thus the instruction at the position "Loop" will be executed outputing 10 (i.e., the current value of AC). Then 2 will be subtracted from AC and the execution will continue from LoopC (due to the "Jump LoopC" instruction). This time the AC will be 8 so the evaluation of Skipcond will make the program continue from "Loop" again, this time outputing 8 first and then subtracting 2 from it. This will continue until AC becomes 0, at which point the program execution will jump to "LoopEnd" and will be halted. Thus, the program will output the values 10, 8, 6, 4 and 2 before halting.

The correct answer is: The program will output the decimal numbers 10, 8, 6, 4 and 2 before ending.

Which of the following equations correctly reflects the truth table shown below? A,B and C are inputs and F is the output.

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Select one:

○ a. F = (A'BC ' + A'BC + AB'C' + ABC' + ABC)'

○ b. F = (AB'C + A'BC' + A'BC' + A'B'C + A'B'C')'

○ c. None of these expressions

○ d. F = AB'C + A'BC' + A'BC' + A'B'C + A'B'C'

○ e. Don't know/no answer

◉ f. F = A'BC' + A'BC + AB'C' + ABC' + ABC ✔

The F output is given as a sum-of-products expression where each product (AND) should correspond to a row where F = 1.

The correct answer is: F = A'BC' + A'BC + AB'C' + ABC' + ABC

What is the effect of a bitwise-OR operation on the following 12-bit words: 1000 1010 1101, 0110 1110 0101?

Select one:

◉ a. 1110 1110 1101 ✔

○ b. Don't know/no answer

○ c. 1110 0100 1000

○ d. 0000 1100 0101

○ e. 0001 0001 0010

○ f. 1111 0011 1010

The OR operation is applied to each of the pairs of bits at the same position in each word, moving from left to right.

The correct answer is: 1110 1110 1101