Discrete Structures

University at Albany
Department of Computer Science
ICSI 210 – Spring 2023

Concept Assignment-1
Assigned: Monday, January 30th, 2023.
Due: Wednesday, February 8th through your Blackboard account by 11:59 PM. Submissions with 20% penalty will be accepted by Monday, February 13th, by 11:59 PM.
Unlimited number of submissions is allowed.

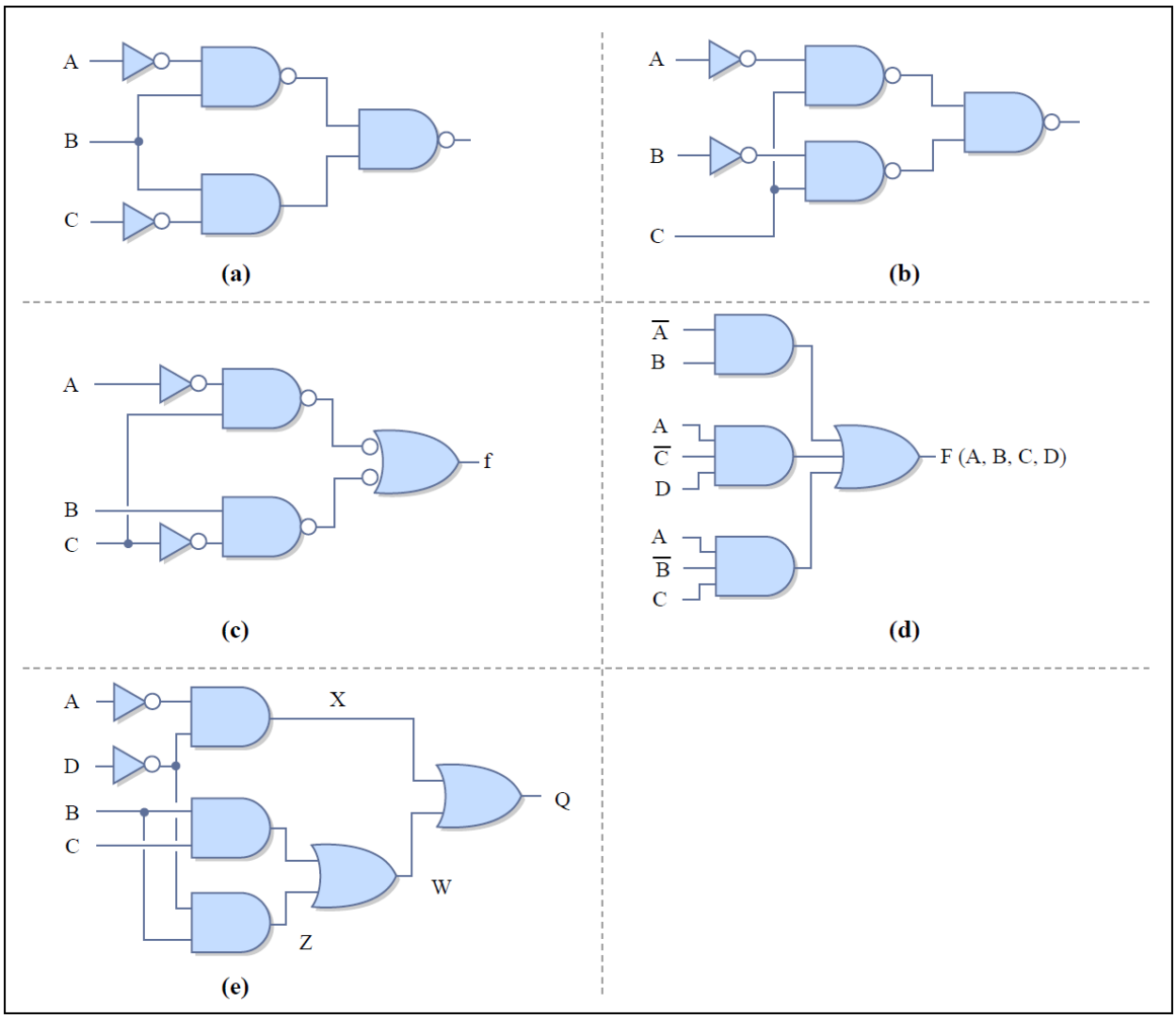
Student Name:

WHAT TO DO

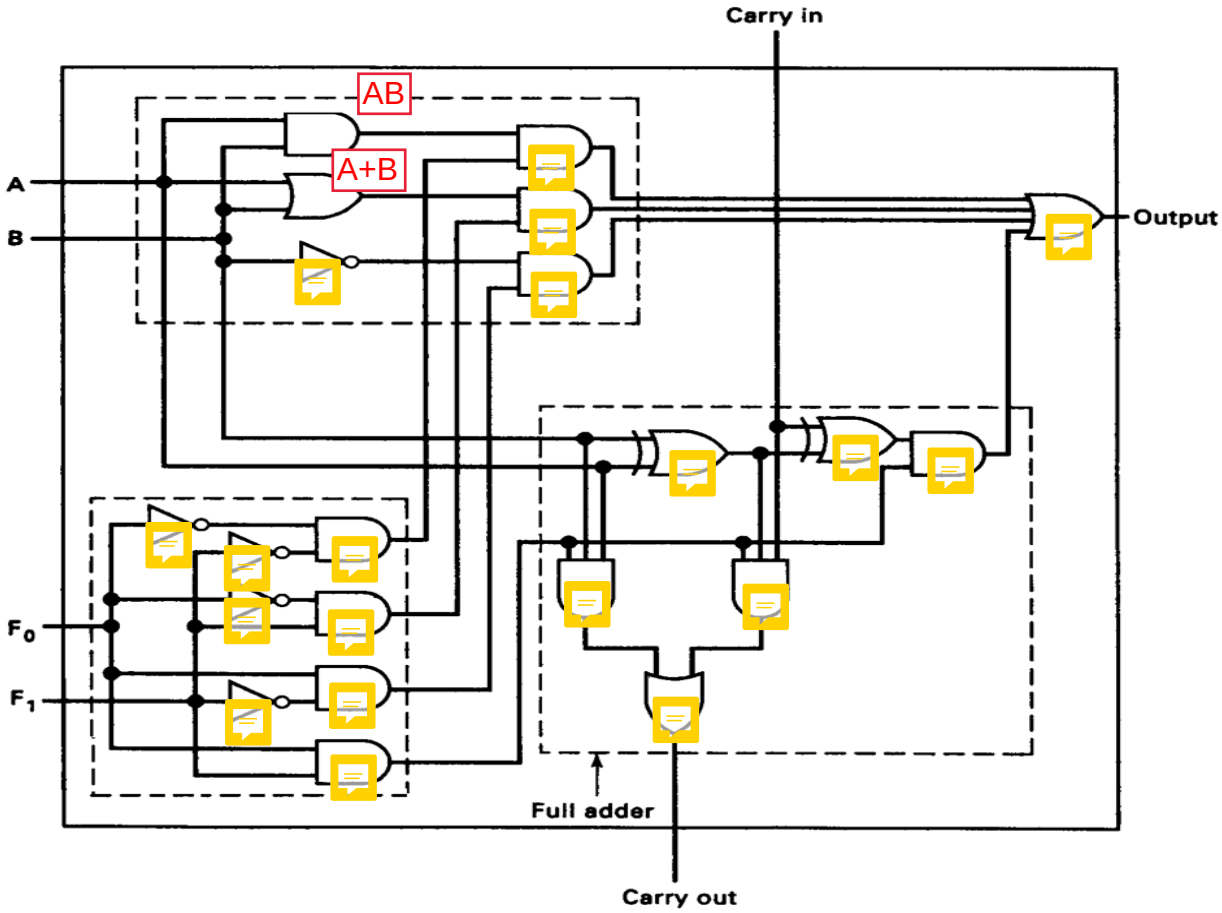
1) [15 marks] Prove the following by using the Boolean identities provided in Table 5.
   a. X + (X' Y + X Y)' = X + Y'
   b. ((X Y) Z) + (Y Z) = Y Z
   c. X' Y = X' Y + X' Y Z
2) [15 marks] For the state table below derive the Boolean expressions (sum-of-products) for the outputs D and B. Your answers for both B and D outputs must use the Exclusive OR (XOR) operator.

Inputs			Outputs	
X	Y	Z	D	B
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

3) [30 marks] For each of the following circuits, determine the sum-of-products expression.



4) [20 marks] Consider the circuit below where **A**, **B**, and **Carry in** are input variables, **Output** and **Carry out** are output variables, and $\mathbf{F_0}$ and $\mathbf{F_1}$ provide the encoding of the four operations this circuit is capable to perform. Determine the function performed by each one of the encoded operations.



WHAT TO SUBMIT

Your answers must be typeset in **MS Word** and submitted through **Blackboard**. Marks will be deducted if you do not follow this requirement. Note that handwritten pictures of answers included in the submitted document will be subject to penalties. The name of your MS Word file must follow the format: *210 Assignment1 Your Name*.