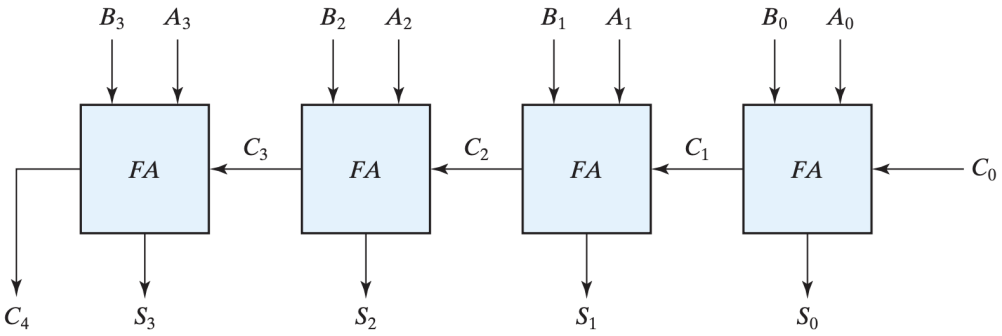
CSCI 160 Spring 2025
Midterm Exam 3
SAMPLE

Name:	
EMPLID:	

◆ Part I ◆

1. Which of the following best describes a combinational circuit?
   (a) It stores previous inputs to determine outputs
   (b) It uses feedback loops and memory elements
   (c) Its outputs depend only on the current combination of inputs
   (d) Its behavior is determined by a sequence of states over time
2. What is the key difference between combinational and sequential circuits?
   (a) Combinational circuits require memory elements
   (b) Sequential circuits do not use Boolean functions
   (c) Combinational circuits depend on past inputs
   (d) Sequential circuits have outputs based on both current and past inputs
3. What additional component do sequential circuits have that combinational circuits do not?
   (a) Input terminals
   (b) Storage elements
   (c) Boolean functions
   (d) Output gates
4. How is the behavior of a sequential circuit best specified?
   (a) With a truth table
   (b) Using only Boolean expressions
   (c) By a time sequence of inputs and internal states
   (d) Through output waveforms only
5. Which statement is TRUE about combinational circuits?
   (a) They can remember past inputs
   (b) They consist of logic gates and storage elements
   (c) Their outputs change based on internal states
   (d) Their outputs are determined solely by present inputs

◆ Part II ◆



1. Consider the four-bit adder given above. Calculate the sum for each binary arithmetic equation and label the coefficients correctly.

   (a) What is the sum of 1010 + 1100?

   (b) What are the values of A_0 to A_3?

   (c) What are the values of B_0 to B_3?

   (d) What are the values of C_0 to C_4?

   (e) What are the values of S_0 to S_3?

CSCI 160 Spring 2025
Midterm Exam 3
SAMPLE

Name:	
EMPLID:	

◆ Part III ◆

1. Draw the truth table for a 3-to-8-line decoder. Your inputs should be sorted in ascending order.

2. Draw the truth table for an octal-to-binary encoder, as presented in the textbook. Your inputs should be sorted in ascending order.

3. Given the circuit diagram for a two-to-one-line multiplexer, choose the correct output for Y when $S = 0$ and $S = 1$.

4. What is the maximum number of output lines for an n-to-m-line decoder, where $n = 5$?

5. How many input lines are there for an n-to-m-line decoder, where $n = 5$?

6. Given a four-variable K-map, write a minimized sum-of-products expression.

7. Given a formula in standard form, give the total number of gates required to implement the equivalent two-level digital logic circuit.

8. Half Adder; draw truth table and digital logic circuit diagram

9. 4-bit binary code with unused bit combinations x,y,z; in converting this code to another, what would be the don't care conditions (design question)