

# Combinational Logic Design

- K-Map structure
  - 2,3, and 4-variable Karnaugh Maps
- K-Map Grouping and Logic Simplification
- K-Map SOP and POS terms
- K-Map Don't Care Conditions
- Logic Design using K-Maps

# Combinational Logic Design

- Example 1
  - Design a combinational logic circuit that shows the results for three people who votes. The three people who votes are labeled as A, B, and C. If two out of the three people or all of them votes for a particular event, then the output of the circuit becomes HIGH ( $V = 1$ ). Else if one or none of them votes, the output becomes LOW ( $V = 0$ ). Design using basic gates.

# Combinational Logic Design

- Design Steps:
  - Identify the number of inputs and outputs of the system, i.e. obtain the block diagram
  - Derive the truth table for the system
  - Using K-Map, obtain the minimum expression
  - Implement the circuit using logic gates
  - Solutions will be discussed in class

# Combinational Logic Design

- Example 2
  - Design a comparison circuit that compares two numbers, that is  $A(A_1, A_0)$  and  $B(B_1, B_0)$  with two bits for each number.  $A_1$  and  $B_1$  are the MSBs while  $A_0$  and  $B_0$  are the LSBs. The logic circuit has four inputs,  $A_1$ ,  $A_0$ ,  $B_1$ , and  $B_0$ , and one output  $F$ .  $F$  is HIGH ( $F=1$ ) when  $A > B$  and  $F$  is LOW ( $F=0$ ) when  $A \leq B$ . Design using basic gates.

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  - Implement the circuit using logic gates
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