Combinational Logic Design Review

COE203
Digital Logic Laboratory

Dr. Ahmad Almulhem
COE - KFUPM
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In combinational circuits, the output at any time is a direct function of the applied external inputs.

\[ Z = F(X) \]
Design procedure

Circuit Specification

Truth Table
How many input/output?

Minimization
K-maps, Algebraic Manipulation. Computer based tools

Logic Diagram
Example

Design a combinational circuit which has 3-bit input number and a single output $F$ where:

- $F = 1$ when the input number is less than 3
- $F = 0$ otherwise.
Design with MSI

• Decoder \((n \rightarrow 2^n)\)
  - Example 2-to-4 decoder

• Encoder \((2^n \rightarrow n)\)
  - Example: 8-to-3 encoder

• Multiplexer \((n \rightarrow 1)\)

• Demultiplexer \((1 \rightarrow n)\)

• Comparator \((=, <, >)\)
Question

A majority function has an output of 1 if there are more 1’s than 0’s in the inputs. Design a 3-input majority function.

(a) Fill the truth table.

(b) Use K-map to simplify F

(c) Draw the circuit
Assignment

- Review Chp 6 & Chp 7 for next time