

T02 Tutorial Slides for Week 8

ENEL 353: Digital Circuits — Fall 2019 Term

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Topics for today

K-map exercises.

Multiplexers and decoders.

Midterm review problems.

Exercise 1: A K-map problem with don't-cares

Let $Y(A, B, C, D) = \sum(4, 10, 11, 12, 14, 15)$, with don't-cares at (1, 3, 5, 8, 9).

Part a. Draw a K-map showing all the 1-cells and X-cells.

Part b. Draw a K-map showing all the 1-cells and X-cells. Then mark the distinguished 1-cells, circle the essential prime implicants (EPI's), and give expressions for the EPI's.

Part c. Find all minimal SOP expressions for Y .

Exercise 2: Another K-map problem with don't-cares

Let $Y(A, B, C, D) = \sum(4, 10, 11, 12, 14)$, with don't-cares at $(1, 3, 5, 8, 9)$. (This is **almost** the same function as in Exercise 1.)

Part a. Draw a K-map showing all the 1-cells and X-cells.

Part b. Draw a K-map showing all the 1-cells and X-cells. Then mark the distinguished 1-cells, circle the essential prime implicants (EPI's), and give expressions for the EPI's.

Part c. Find all minimal SOP expressions for Y .

Exercise 3: Multiplexers and decoders

Part a: Make a circuit for the truth table using an inverter and two 4:1 multiplexers.

Part b: Make a circuit for the truth table using a 3:8 decoder and two OR gates.

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

Exercise 4: Bit patterns

Why is the following question not fair to ask?

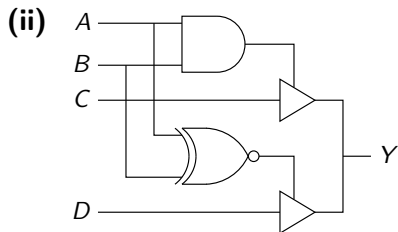
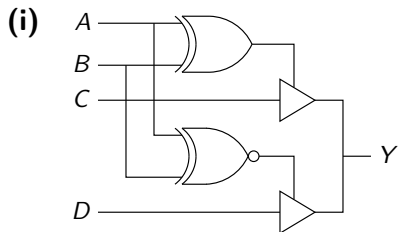
“What number does the 8-bit pattern 10010111 represent?”

Exercise 5: Two's-complement

In a 16-bit two's-complement system, what number does the bit pattern 0010 0100 0000 1000 represent?

In an 8-bit two's-complement system, what number does the bit pattern 1111 0111 represent?

Exercise 6: Tristate buffers and contention



Which statement below is true? Give a correct explanation for your answer.

- A. Contention is possible in circuit (i) but not in circuit (ii).
- B. Contention is possible in circuit (ii) but not in circuit (i).
- C. Contention is possible in both circuits.
- D. Contention is not possible in either circuit.