CSE222 Computer Architecture
Homework Set 07

(**Review**)

1. Gates and Circuits
   a. Gates and Circuits
   b. Elements and Nodes
   c. Combinational and Sequential Circuits
2. Truth table, Boolean equation, Logic diagram
3. Boolean equations
   a. Terms: complement, literal, implicant, minterm, maxterm
   b. POS form, SOP form
   c. A1-A5 Axioms, T1-T5, T6-T12 theorems
4. Simplifying Boolean equations through
   a. Boolean theorems
   b. K-map
5. Combinational Circuits/Combinational Building blocks
   a. Multiplexer (MUX)
   b. Decoder

(**Exercise**)

1. The following is the truth table of a logic circuit, use different circuits to implement this function:

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

   (a) 8:1 multiplexer

   (b) 4:1 multiplexer

   (c) 2:1 multiplexer

   (d) 3:8 decoder

2. The following is the truth table of a logic circuit, use different circuits to implement this function:

A	B	C	D	Y
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

(a) 8:1 multiplexer

(b) 4:1 multiplexer + 2:1 multiplexer (clue: use **two** 4:1 MUX + **one** 2:1 MUX)

3. Implement the following function:

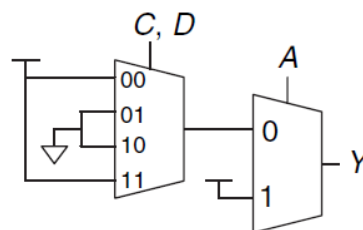$$Y = A\overline{B} + \overline{A}\,C + \overline{B}\,\overline{C}$$
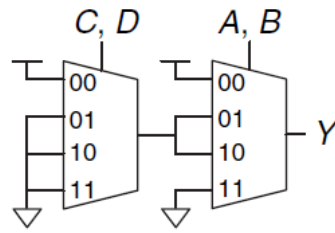
With:

    (a) 8:1 multiplexer

    (b) 4:1 multiplexer

    (c) 3:8 decoder

4. Write a minimized Boolean equation for the function performed by the circuits below. Draw diagram using logic gates to perform the same functionality.

(a)

C, D   A, B

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      00        00
      01        01       Y
      10        10
      11        11
```

(b)