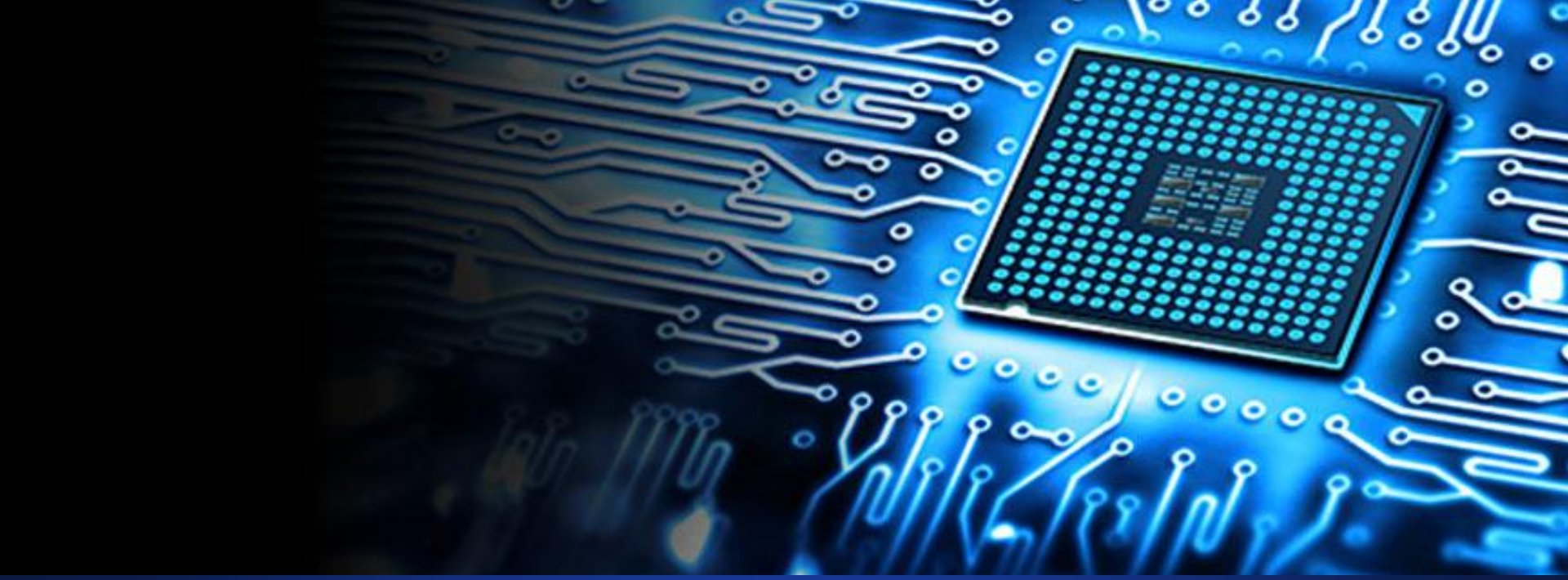

Chapter 1: Exercises

Version: 2023/01/02

1. Prove that the following identities are valid using algebraic manipulation.

(a) AB' + BC' + CA' = A'B + B'C + C'A

(b) AB + A'C + BCD = AB + A'C

2. Find the complements of the following functions.

(a) F = A + BC

(b) F = AB + B'C + CA'D

4. Simplify the following expressions by means of a four-variable map.

(a) A'D + BD + B'C + AB'D

(b) X'Z + W'XY' + W(X'Y + XY')

(c) AB'C + B'C'D' + BCD + ACD' + A'B'C + A'BC'D

(d) ABC + CD + BC'D + B'C

5. Design a combinational circuit whose input ($A_3A_2A_1A_0$) is a four-bit number and whose output ($F_3F_2F_1F_0$) is the 2's complement of the input number.

6. Design a mealy sequential circuit which converts the X sequence input to the Z sequence output. Try to use as less states as possible.

X input			Z output		
t2	t1	t0	t2	t1	t0
0	0	0	0	1	1
0	0	1	1	0	0
0	1	0	1	0	1
0	1	1	1	1	0
1	0	0	1	1	1