

# Homework 1

CS51A Fall 2018

October 4, 2018

1. Perform the indicated conversions.

(a) Convert  $9740.53_{10}$  to binary and octal

(b) Convert  $3095.6_{10}$  to binary and hexadecimal

Solution

(a)  $9740.53_{10} = (10011000001100.10000111101011\dots)_2 = (23014.4172\dots)_8$

(b)  $3095.6_{10} = (110000010111.100110\dots)_2 = (6027.46\dots)_8$

2. Simplify the following expressions using Boolean algebra.

(a)  $AB + A(CD + C\overline{D})$

(b)  $(B\overline{C} + \overline{A}D)(\overline{A}\overline{B} + C\overline{D})$

Solution

(a)  $AB + A(CD + C\overline{D}) = AB + AC(D + \overline{D}) = AB + AC = A(B + C)$ .

(b)  $(B\overline{C} + \overline{A}D)(\overline{A}\overline{B} + C\overline{D}) = B\overline{C}A\overline{B} + \overline{A}DC\overline{D} + \overline{A}D\overline{A}\overline{B} + B\overline{C}C\overline{D} = 0 + 0 + 0 + 0 = 0$ .

3. Using identities from Switching Algebra, convert the following truth table to a switching expression and simplify the expression as much as possible.

x	y	z	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Table 1: Truth Table

Solution  $F = (x + y + \bar{z})(\bar{x} + y + \bar{z}) = y + \bar{z}$ .

4. You are given decimal numbers 5 and 8 in BCD format of 0101 and 1000. Explain how you will add them in BCD format and represent the result in BCD format.

Solution First add 0101 and 1000 to get 1101 and since 1101 represents 13 which is greater than 1001 add 0110 (which is 6 in decimal format) and get 10011. Write the carry in BCD as 0001 and write the total result as 0001 0011 which is 1 and 3 representing 13 in BCD.

5. Obtain the truth table and express function  $(x + yz)(z + xz)$  as a sum-of-minterms and a product-of-maxterms.

Solution

	x	y	z	$(x + yz)$	$(z + xz)$	$(x+yz)(z + xz)$
0	0	0	0	0	0	0
1	0	0	1	0	1	0
2	0	1	0	0	0	0
3	0	1	1	1	1	1
4	1	0	0	1	0	0
5	1	0	1	1	1	1
6	1	1	0	1	0	0
7	1	1	1	1	1	1

Table 2: Truth table to  $(x + yz)(z + xz)$

The minterms are the ones with 1s:  $\Sigma(3, 5, 7)$ .

The maxterms are the ones with the 0s:  $\Pi(0, 1, 2, 4, 6)$ .