Hw1 Solution

1. Convert the decimal number to Binary and Hexadecmal values

a. 529 529/16 = 33 – 1

33/16 = 2 – 1

= $211 = 0010 0001 0001

b. 24.275 = 0001 1000 . 0100 0110 0110 0110 0110 0110

2. Express the following numbers in decimal a. (1010.11)b b. (9ABC.A)16

10.75

3. Perform subtraction by 2's complementing the subtrahend and adding. Assume the numbers to be of 8 bits

a. (1000 1101)b - (1 0010)b 1000 1101 + 1110 1110 = 0111 1011

b. (1 0010)b - (1000 1101)b 0001 0010 + 0111 0011 = 1000 0101 = - 7B

4. Write the expression "SOS 16" in ASCII, using an eight-bit code. Include the space. Treat the left most bit of each character as a parity bit. Each 8-bit code should have even parity

SOS 16 = 101 0011 100 1111 101 0011 010 0000 011 0001 011 0110

With even parity = 0101 0011 1100 1111 0101 0011 1010 0000 1011 0001 0011 0110 =

In Hex - 53 CF 53 A0 B1 36

5.

1.30 73 F4 E5 76 E5 4A EF 62 73

73:	0_111_0011	s
F4:	1_111_0100	t
E5:	1_110_0101	e
76:	0_111_0110	v
E5:	1_110_0101	e
4A:	0_100_1010	j
EF:	1_110_1111	o
62:	0_110_0010	b
73:	0_111_0011	s

(upper case J in Problem 30) b) odd parity

6. Minimize the following Boolean expression to minimum number of literals

a) (x+y+z')(x'y+z)
xz+x'y+yz+x'yz' = xz +x'y +yz = xz + x'y

b) b) w'xy + wxy' + wxy + w'xy' = w'x+wx = x

7. We can perform logical operations on strings of bits by considering each pair of corresponding bits separately (called bitwise operation). Given two sixteen-bit strings A = $(F00F)_{16}$ and B = $(F0)_{16}$, evaluate the sixteen-bit result after the following logical operations:

(a) A AND B F00F AND 00F0 = 0000

(b) A OR B F00F AND 00F0 = F0FF

(c) A XOR B F00F XOR 00F0 = F0FF
(d) NOT A 0FF0
(e) NOT B FF0F

8.

(d) $bd' + acd' + ab'c + a'c' = \Sigma\,(0, 1, 4, 5, 10, 11, 14)$

$F' = \Sigma\,(2, 3, 6, 7, 8, 9, 12, 13, 15)$

$F = \Pi\,(02, 3, 6, 7, 8, 12, 13, 15)$

a b c d	F
0 0 0 0	1
0 0 0 1	1
0 0 1 0	0
0 0 1 1	0
0 1 0 0	1
0 1 0 1	1
0 1 1 0	0
0 1 1 1	0
1 0 0 0	0
1 0 0 1	0
1 0 1 0	1
1 0 1 1	1
1 1 0 0	1
1 1 0 1	0
1 1 1 0	1
1 1 1 1	0

9.

2.21 *(a)* $F(x, y, z) = \Sigma(1, 3, 5) = \Pi(0, 2, 4, 6, 7)$

(b) $F(A, B, C, D) = \Pi(3, 5, 8, 11) = \Sigma(0, 1, 2, 4, 6, 7, 9, 10, 12, 13, 14, 15)$

10. Complement the following function using DeMorgan's theorem. f = ((A+B'C)'C+ AB'C + A')'

F = ((A+B'C)'C)' . (AB'C)' . (A')'

= ((A+B'C) + C') . (A'+B+C') . A

= (A+B'C+C')(A'+B+C')A