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ECE 218
Assignment #1

1.3 a) $(4310)_5$

$= (4)\times 5^3 + (3)^2 + (1)\times 5^1 + (0)\times 5^0$

$= 500 + 75 + 5 + 0$

$= 580$

$(4310)_5 = (580)_{10}$

b) $(198)_{12} = (1)\times 12^2 + (9)\times 12^1 + (8)\times 12^0$

$= 144 + 108 + 8$

$= 260$

$(198)_{12} = (260)_{10}$

c) $(435)_8$

$= (4)\times 8^2 + (3)\times 8^1 + (5)\times 8^0$

$= 256 + 24 + 5$

$= 285$

$(435)_8 = (285)_{10}$

d) $(345)_6 = (3)\times 6^2 + (4)\times 6^1 + (5)\times 6^0$

$= 108 + 24 + 5$

$= 137$

$(345)_6 = (137)_{10}$

1.9) d) $(DABA.B)_{16}$

$= (13)\times 16^3 + (10)\times 16^2 + (11)\times 16^1 + (10)\times 16^0 + (11)\times 16^{-1}$

$= 53248 + 2560 + 176 + 10 + 0.6875$

$= 55994.6875$

$(DABA.B)_{16} = (55994.6875)_{10}$

e) $(1011.1001)_2 = (1)\times 2^3 + (0)\times 2^2 + (1)\times 2^1 + (1)\times 2^0 + (1)\times 2^{-1} + (0)\times 2^{-2} + (0)\times 2^{-3} + (1)\times 2^{-4}$

$= 8 + 0 + 2 + 1 + 0.5 + 0 + 0 + 0.0625$

$= 11.5625$

$(1011.1001)_2 = (11.5625)_{10}$

1.13) a) $(27.315)_{10}$

Divide | Multiply

$2 \lfloor 27$	$0.315 \times 2 = 0.630 \rightarrow 0$
$2 \lfloor 13 \rightarrow 1$	$0.630 \times 2 = 1.26 \rightarrow 1$
$2 \lfloor 6 \rightarrow 1$	$0.26 \times 2 = 0.52 \rightarrow 0$
$2 \lfloor 3 \rightarrow 0$	$0.52 \times 2 = 1.04 \rightarrow 1$
$1 \rightarrow 1$	$0.04 \times 2 = 0.08 \rightarrow 0$

$\therefore (27.315)_{10} = (11011.01010)_2$

b) $2/3$ in decimal form is 0.66666667

Multiply

$0.66666667 \times 2 = 1.33333334 \rightarrow 1$

$0.33333334 \times 2 = 0.66666668 \rightarrow 0$

$0.66666668 \times 2 = 1.33333336 \rightarrow 1$

$0.33333336 \times 2 = 0.66666672 \rightarrow 0$

$0.66666672 \times 2 = 1.33333344 \rightarrow 1$

$0.33333344 \times 2 = 0.66666688 \rightarrow 0$

$0.66666688 \times 2 = 1.33333376 \rightarrow 1$

$0.33333376 \times 2 = 0.66666752 \rightarrow 0$

$(2/3)_{10} = (0.10101010)_2 = 0 + (1) \times 2^{-1} + (1) \times 2^{-3} + (1) \times 2^{-5} + (1) \times 2^{-7}$

$= (0.6640625)_{10}$ — (i)

c) $(0.1010\ 1010)_2 = (0.AA)_{16}$

$\therefore (0.AA)_{16} = (10) \times 16^{-1} + (10) \times 16^{-2}$

$= 0.625 + 0.0390625$

$= (0.66406)_{10}$ — (ii)

(i) = (ii)

1.14) a) 10010000

1's complement of 10010000 : $\boxed{01101111}$

2's complement of 10010000 : $\boxed{01110000}$

b) 00000000

1's complement of 00000000 : $\boxed{11111111}$

2^s complement of 0000 0000 : $\boxed{0000\ 0000}$

c) 110 11010

1^s complement of 11011010 : $\boxed{00100101}$

2^s complement of 11011010 : $\boxed{00100110}$

d) 10101010

1^s complement of 10101010 : $\boxed{01010101}$

2^s complement of 10101010 : $\boxed{01010110}$

e) 10 100101

1^s complement of 10100101 : $\boxed{01011010}$

2^s complement of 10100101 : $\boxed{01011011}$

f) 1111 1111

1^s complement of 1111 1111 : $\boxed{0000\ 0000}$

2^s complement of 1111 1111 : $\boxed{0000\ 0001}$

1.18) a) 10011 - 10010

$x = 10011$

$y = 10010$

2^s complement of y (z) = 01110

$$\begin{array}{lr} x & 10011 \\ + z & + \ 01110 \\ \hline & \boxed{1}\,00001 \end{array}$$

∴ The answer is $\boxed{00001}$ and carry '1' is discarded or $\boxed{1}$

b) 100010 - 100110

$x = 100010$

$y = 100110$

2^s complement of y (z) = 011 010

$x + z$ = 111100

2^s complement of $(x+z)$: 000100
∴ Since there's no carry, final answer is $\boxed{-100}$ or $\boxed{000100}$

c) 1001 − 110101

x = 1001

y = 110101

2^s complement of y (z) = 001011

$x + z$ = 010100

2^s complement of $(x+z)$ = 101100

∴ Since there's no carry, final answer is $\boxed{-101100}$

d) 101000 − 10101

x = 101000

y = 010101

2^s complement of y (z) = 101011

$x + z$ = $\boxed{1}$ 010011

Since there's end carry, final answer is $\boxed{010011}$.

1.23)

Decimal					BCD		
	7	9	1		0111	1001	0001
+	6	5	8	+	0110	0101	1000
					1101	1110	1001
				+	0110	0110	↓
1	4	4	9		10100	0100	1001

∴ BCD sum of 791 and 658 is $\boxed{(0001\ 0100\ 0100\ 1001)_2}$ or $\boxed{(1449)_{10}}$

1.25) Referring to table 1.5 in textbook

Decimal	6	2	4	8
BCD code	0110	0010	0100	1000
Excess-3 code	1001	0101	0111	1011
2421 code	1100	0010	0100	1110
6311 code	1000	0011	0101	1011

BCD code for 6248 is 0110 0010 0100 1000
Excess-3 code for 6248 is 1001 0101 0111 1011
2421 code for 6248 is 1100 0010 0100 1110
6311 code for 6248 is 1000 0011 0101 1011

1.30) Using ASCII in textbook

a) The ASCII string that is formed is.

73	0_111	0011
F4	1_111	0100
E5	1_110	0101
76	0_111	0110
E5	1_110	0101
4A	0_100	1010
EF	1_110	1111
62	0_110	0010
73	0_111	0011

(Table 1 convert hexadecimal to bit form)

Comparing the bit form to the ASCII table

0_111	0011	s
1_111	0100	t
1_110	0101	e
0_110	0110	v
1_110	0101	e
0_100	1010	J
1_110	1111	o
0_110	0010	b
0_111	0011	s

(Table 2)

b) In each case, the number of 1's inserted in Table 2 is odd so it is an $\boxed{\text{odd parity}}$.