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ASSIGNMENT 2

Question # 1

(a)

The given number is:

Sign	Magnitude
0	1111100001010 11

The magnitude can be written as: $1.1111000010101 1 \times 2^{14}$

$\Rightarrow$ Exponent $= 14 + 127 = 141_{10} = 10001101_2$

Therefore, In floating point format:

S	Exponent	Magntissa
0	10001101	11110000101011000000000

(b)

Given number is: 1 - 00110000110001

The magnitude can be written as: $1.1000001100011 \times 2^{12}$

And the exponent as: $12 + 127 = 139 = 10001011_2$

Thus, the floating point format is:

S	E	M
1	10001011	10000110001000000000000

(c)

- Sign-Mag Form: 1-00010000 1100010
- Magnitude: $1.0000110001_2 \times 2^{11}$
- Exponent: $11 + 127 = 138 = 10001010_2$
- Floating:

S	E	M
1	10001010	00001100010000000000000

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Question # 2

(a)

Given: 0 10000011 01001001110001000000000

Here, Exponent = 10000011 $= 2^7 + 2^1 + 2^0 = 131$

$\therefore$ Number$_{10}$ $= (-1)^S (1+F)(2^{E-127})$

$\therefore$ Number$_{10}$ $= (-1)^0 (1.01001001110001)(2^4)$

$= 1.01001001110001 \times 2^4$

$= 11001.00111001 = 1.28814 \times 2^4$

$= 25.220703125 = 20.61035$

(b)

Given: 1 00110000011000 11001100 10000111110100 10....

$\Rightarrow$ Exponent: $1100110.00_2 = 2^7 + 2^6 + 2^3 + 2^2 = 204$

Now, $\therefore N_{10} = (-1)^1 (1.10000111110100 1)(2^{204-127})$

$= -1.530548 \times 10^{77} \times 2^{77}$

$= -2.312897 44 \times 10^{23}$

(c)

Given: 1 10011000 10000100010100110000000

$\Rightarrow$ Exponent: $10011000_2 = 152_{10}$

$\therefore N_{10} = (-1)^1 (1.10000100010100 11)(2^{152-127})$

$= -(1.51689147949218 75)(2^{25})$

$= -50898431.98$

OR

$N_{10} = -(11000010001010011000000000)$

$= -50898432$

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Question #3

a) 48A6
⇒ 0100 1000 1010 0110

b) F4C6 ⇒ 1111 0100 1100 0110

c) B426 ⇒ 1011 0100 0010 0110

d) 1A3D6 ⇒ 0001 1010 0011 1101 0110

Question #4

a) 11110110 ⇒ F6

b) 10101011 ⇒ AB

c) 1011 1001 1011 ⇒ B9B

d) 1010 1101 010 ⇒ 5GA

e) 1010 1110 1100 ⇒ AEC

Question 5

a) $4226_{16} \Rightarrow 4\times16^3 + 2\times16^2 + 2\times16^1 + 6\times16^0 = 16384 + 512 + 32 + 6$
$\Rightarrow 16934_{10}$

b) $6426_{10} \Rightarrow 6\times16^3 + 4\times16^2 + 2\times16^1 + 6\times16^0 = 24576 + 1024 + 32 + 6$
$\Rightarrow 25638_{10}$

c) $2B26_{16} \Rightarrow 8192 + 2816 + 32 + 6 = 11016_{10}$

d) $ABC26_{16} \Rightarrow 655360 + 45056 + 3072 + 32 + 6 = 703529_{10}$

e) $6F226_{16} \Rightarrow 393216 + 61440 + 512 + 32 + 6 = 455206_{10}$

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Question #6

a) 3654:

① $\frac{3654}{16} = 228.375 \Rightarrow 0.375 \times 16 = 6$

② $\frac{228}{16} = 14.25 \Rightarrow 0.25 \times 16 = 4$

③ $\frac{14}{16} = 0.875 \Rightarrow 0.875 \times 16 = 14 (E)$

$\therefore 3654_{10} = E46_{16}$

b) 7824:

① $\frac{7824}{16} = 489.125 \Rightarrow 0.125 \times 16 = 2$

② $\frac{486}{16} = 30.5625 \Rightarrow 0.5625 \times 16 = 9$

③ $\frac{30}{16} = 1.875 \rightarrow 0.875 \times 16 = E$

④ $1/16 = 0.0625 \Rightarrow 0.0625 \times 16 = 1$

$\therefore 7824_{10} = 1E92_{16}$

c) 8926:

① $\frac{8926}{16} = 557.875 \Rightarrow 0.875 \times 16 = E$

② $\frac{557}{16} = 34.8125 \Rightarrow 0.8125 \times 16 = D$

③ $\frac{34}{16} = 2.125 \Rightarrow 0.125 \times 16 = 2$

④ $\frac{2}{16} = 0.125 \Rightarrow 0.125 \times 16 = 2$

$\therefore 8926_{10} = 22DE_{16}$

d) 551_{10} :

$\frac{551}{16} = 34.4375 \Rightarrow 0.4375 \times 16 = 7$

$\frac{34}{16} = 2.125 \Rightarrow 0.125 \times 16 = 2$

$\frac{2}{16} = 0.125 \Rightarrow 0.125 \times 16 = 2$

$\therefore 551_{10} = 227_{16}$

e) 3682_{10} :

$\frac{3682}{16} = 230.125 \Rightarrow 0.125 \times 16 = 2$

$\frac{230}{16} = 14.375 \Rightarrow 0.375 \times 16 = 6$

$\frac{14}{16} = 0.875 \Rightarrow 0.875 \times 16 = E$

$\therefore 3682_{10} = E62_{16}$

Question # 7

a) 4124 $\Rightarrow$ 0100 0001 0010 0100

b) 6139 $\Rightarrow$ 0110 0001 0011 1001

c) 918 $\Rightarrow$ 1001 0001 1000

d) 2341 $\Rightarrow$ 0010 0011 0100 0001

e) 225 $\Rightarrow$ 0010 0010 0101

f) 36455 $\Rightarrow$ 0011 0110 0100 0101 0101

Question # 8

a) 10 0011 0000 ⇒ 230
b) 0 0100 1011 0111 ⇒ 4 Invalid BCD code
c) 0 0111 0100 0110 ⇒ 746
d) 01 0011 0010 0001 ⇒ 1321
e) 0111 0101 0100 ⇒ 754
f) 1000 0000 0000 ⇒ 800
g) 1001 0111 1000 ⇒ 978
h) 0001 0110 1000 0011 ⇒ 1683

Question # 9

a) 100~~8~~1100~~8~~0 (1) ⇒ even no. of 1s ⇒ no error
b) ~~00100101101111~~ 011101010 ⇒ odd no. of 1s ⇒ error
c) ~~00111010001110~~ 1011111101000 1010 ⇒ even no. ⇒ no error

Question # 10

a) 1111 0110 ⇒ six 1s ⇒ error
b) 0011 0001 ⇒ three 1s ⇒ no error
c) 0101 0100 1010 1010 ⇒ eight 1s ⇒ error

Question # 11

a) 1 10100100
b) 0 00001001
c) 1 11111110

Question # 12

a) 11011 ⇒ 10110
b) 1001010 ⇒ 1101011
c) 1111011101110 ⇒ 1000110011001

Question # 13

a) 1010 ⇒ 1100
b) 00010 ⇒ 00011
c) 11000010001 ⇒ 10000011110

Question #14

a)
```
  1001
+ 0110
------
  1111
+ 0110   ; Adding 6 because > 9
------
 10101
```
⇒ 0001 0101 is the answer

b)
```
   0011
+  1001
-------
   1100
+  0110   ; because > 9
-------
  10010
```
⇒ 0001 0010 is the answer

c)
```
  1001          10010
+ 1001        + 0110   ; became > 9
------        -------
 10010         11000
```
⇒ 0001 1000 is the answes

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d) 1001 + 0111 = 10000 → 10000 + 0110 ; because > 9 = 10110

⇒ 0001 0110 is the answer

e) 0011 0101 + 0110 0111 = 1001 1100 + 0110 ; because > 9 = 1010 0010

⇒ 1010 0010 is the answer

f) 0101 0011 + 0101 1000 = 1010 1011 + 0110 0110 ; because > 9 = 1 0001 0001

⇒ 0001 0001 0001 is the answer

g) 1001 0101 + 1001 0111 = 10010 1100 + 0110 0110 ; because > 9 = 1 1001 0010

⇒ 0001 1001 0010 is the answer

h) 0101 0110 0011 + 0011 0010 1000 = 1000 1000 1011 + 0110 ; because > 9 = 1000 1001 0001

⇒ 1000 1001 0001 is the answer