CS4341   Assignment 1   Yuan Zhuang

Question 1

(1) Convert to Binary from decimal numbers.

2	176	Reminder		2	59	Reminder
2	88	0		2	29	1
2	44	0		2	14	1
2	22	0		2	7	0
2	11	0		2	3	1
2	5	1		2	1	1
2	2	1			0	1
2	1	0				
	0	1				

$\boxed{10110000_2}$ for $\boxed{176_{10}}$ $\boxed{111011_2}$ for $\boxed{59_{10}}$

2	115			2	76	
2	57	1		2	38	0
2	28	1		2	19	0
2	14	0		2	9	1
2	7	0		2	4	1
2	3	1		2	2	0
2	1	1		2	1	0
	0	1			0	1

$\boxed{1110011_2}$ for $\boxed{115_{10}}$ $\boxed{1001100_2}$ for $\boxed{76_{10}}$

```
2 | 66
2 | 33    0
2 | 16    1
2 | 8     0
2 | 4     0
2 | 2     0
2 | 1     0
    0     1
```

$$\boxed{1000010_2} \text{ for } \boxed{66_{10}}$$

(2)   Convert to Hexadecimal form decimal number

```
16 | 176
16 | 11    0
     0     11  .... B (in Hexa)
```

$$\boxed{B0_{16}} \text{ for } \boxed{176_{10}}$$

```
16 | 59
16 | 3     11 (B in Hexa)
     0     3
```

$$\boxed{3B_{16}} \text{ for } \boxed{59_{10}}$$

```
16 | 115
16 | 7     3
     0     7
```

$$\boxed{73_{16}} \text{ for } \boxed{115_{10}}$$

```
16 | 76
16 | 4     12  (C in Hexa)
     0     4
```

$$\boxed{4C_{16}} \text{ for } \boxed{76_{10}}$$

```
16 | 66
16 | 4     2
     0     4
```
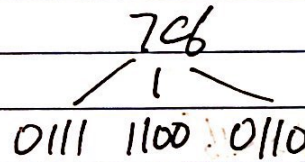
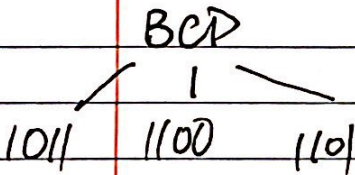$$\boxed{42_{16}} \text{ for } \boxed{66_{10}}$$

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Question 2

Convert from Hexadecimal to Binary number.

1.   5FC   F1A

$\underbrace{0101}\ \underbrace{1111}\ \underbrace{1100}$ = $\underbrace{1111}\ \underbrace{0001}\ \underbrace{1010}$

$\boxed{(0101\ 1111\ 1100)_2}$ for $\boxed{5FC_{16}}$ $\boxed{1111\ 0001\ 1010_2}$ for $\boxed{F1A_{16}}$

          BCD   7C6
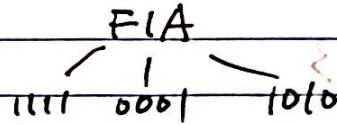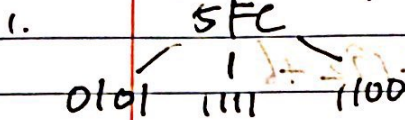
$\underbrace{1011}\ \underbrace{1100}\ \underbrace{1101}$ $\underbrace{0111}\ \underbrace{1100}\ \underbrace{0110}$

$\boxed{1011\ 1100\ 1101_2}$ for $\boxed{BCD_{16}}$ $\boxed{0111\ 1100\ 0110_2}$ for $\boxed{7C6_{16}}$

          FCA
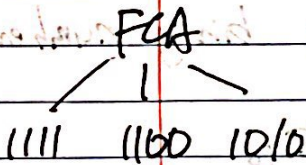
$\underbrace{1111}\ \underbrace{1100}\ \underbrace{1010}$

$\boxed{1111\ 1100\ 1010_2}$ for $\boxed{FCA_{16}}$

2.   Convert from Hexadecimal to Decimal.
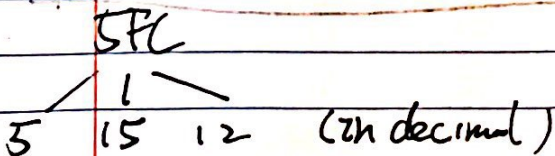
          5FC   F1A

$\underbrace{5\quad 15\quad 12}$ (in decimal) $\underbrace{15\quad 1\quad 10}$

$5\times 16^2 + 15\times 16^1 + 12\times 16^0$ $15\times 16^2 + 1\times 16^1 + 10\times 16^0$

$= 1280 + 240 + 12$ $= 3840 + 16 + 10$

$= \boxed{1532}$ $= \boxed{3866}$

BCD
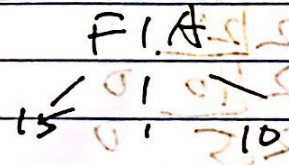
15 / 12 13 → 11 12 13

$11 \times 16^2 + 12 \times 16^1 + 13 \times 16^0$

$= 2816 + 192 + 13$

$= \boxed{3021}$

7C6

7 / 12 6

$7 \times 16^2 + 12 \times 16^1 + 6 \times 16^0$

$= 1792 + 192 + 6$

$= \boxed{1990}$

FCA

15 12 10

$15 \times 16^2 + 12 \times 16^1 + 10 \times 16^0$

$= 3840 + 192 + 10$

$= \boxed{4042}$

Question 3
(A)   Convert 1325_{10} into 32-bit twos complement binary number.

① $10100101101_2 = 1325_{10}$

```
2│1325   1
 2│662    0
 2│331    1
 2│165    1
 2│82     0
 2│41     1
 2│20     0
 2│10     0
 2│5      0
 2│2      1
 2│1      0
   0      1
```

② To 32-bits

$\boxed{00000000000000000000\,|\,0\,|00\,|0\,|\,1\,|0\,|\,1_2}$

21-bits   11-bits

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B)   Convert -1325_{10} to 32-bit two's complement binary number

invert what we got for 1325_{10}, which is

① 00000000 00000000 0101001011 01₂ , we got

② 11111111 11111111 1010110100 10₂

③ Add 1 to the last bit, we got

11111111 11111111 1010110100 11₂ = -1325_{10}

Question 4   What does this binary number present in decimal number?

1111 1111 1111 1111 1111 1011 1000 1001₂

The most significate number is 1, so the decimal is negative

① Minus one for the bit

1111 1111 1111 1111 1111 1011 1000 1000

② invert.

0000 0000 0000 0000 0000 0100 0111 0111

③ To Hexadecimal

0   0   0   0   0   4   7   7 ₁₆

④ convert to decimal
$4 \times 16^2 + 7 \times 16^1 + 7 \times 16^0$

= 1143   ⑤ so number is negative

$\boxed{-1143}$