

HW 1 Solution

1) a. 10000011

→ Base 8  $\begin{array}{ccc} 0 & & \\ \downarrow & & \\ \underline{1000} & \underline{0011} & \\ 2 & 0 & 3 \end{array} = 203_8 \#$

$2^3 = 8$   
↓  
จับกลุ่มเลขฐาน 2 กลุ่มละ 3 bits  
เริ่มจากขวาสุด

→ Base 16  $\begin{array}{cc} \underline{1000} & \underline{0011} \\ 8 & 3 \end{array} = 83_{16} \#$

จับกลุ่มกลุ่มละ 4 bit  
↑  
 $2^4 = 16$

→ Base 10  $= 1 \cdot 2^7 + 0 \cdot 2^6 + 0 \cdot 2^5 + 0 \cdot 2^4 + 0 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0$   
 $= 128 + 2 + 1 = 131 \#$

Base 10 (10)	Base 10 (2)	Base 10 (16)	Base 10 (10)	Base 10 (16)	conversion
1	0001	1	9	1001	9
2	0010	2	10	1010	A
3	0011	3	11	1011	B
4	0100	4	12	1100	C
5	0101	5	13	1101	D
6	0110	6	14	1110	E
7	0111	7	15	1111	F
8	1000	8	16	10000	10

b. 1101101

→ Base 8  $\begin{array}{ccc} 00 & & \\ \downarrow \downarrow & & \\ \underline{1101} & \underline{101} & \\ 1 & 5 & 5 \end{array} = 155_8 \#$

→ Base 16  $\begin{array}{cc} \underline{1101} & \underline{101} \\ 6 & D \end{array} = 6D_{16} \#$

→ Base 10  $1 \cdot 2^6 + 1 \cdot 2^5 + 0 \cdot 2^4 + 1 \cdot 2^3 + 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0$   
 $= 64 + 32 + 8 + 4 + 1 = 109 \#$

2) a. 05<sub>8</sub>

→ Base 2  $\begin{array}{cc} 0 & 5 \\ \underline{000} & \underline{101} \end{array} = 101_2 \#$

เปลี่ยนค่าของเลขฐาน 8 เป็น  
เลขฐาน 2 (ตัวละ 3 bits)

→ Base 10  $= 0 \cdot 8^1 + 5 \cdot 8^0 = 5 \#$

→ Base 16  $\begin{array}{cc} 00 & \\ \downarrow \downarrow & \\ \underline{000} & \underline{101} \\ 0 & 5 \end{array} = 5_{16} \#$

เปลี่ยนเลขฐาน 2 ก่อนจับกลุ่ม  
4 bits แล้วทำเป็น  
ฐาน 16

② b.  $723_8$

→ base 2  $\underline{111} \underline{010} \underline{011} \#$

→ base 10  $7 \cdot 8^2 + 2 \cdot 8^1 + 3 \cdot 8^0$   
 $= 448 + 16 + 3 = 467 \#$

→ base 16  $\overset{000}{\downarrow\downarrow\downarrow} \underline{111} \underline{010} \underline{011} = 1D3_{16} \#$   
                   1    D    3

3) a. 2011

- $2^{11} = 2048$
- $2^{10} = 1024$
- $2^9 = 512$
- $2^8 = 256$
- $2^7 = 128$
- $2^6 = 64$
- $2^5 = 32$
- $2^4 = 16$
- $2^3 = 8$
- $2^2 = 4$
- $2^1 = 2$
- $2^0 = 1$

2011	2 <sup>10</sup>
1024	2 <sup>9</sup>
987	2 <sup>8</sup>
512	2 <sup>7</sup>
475	2 <sup>6</sup>
256	2 <sup>5</sup>
219	2 <sup>4</sup>
128	2 <sup>3</sup>
91	2 <sup>2</sup>
64	2 <sup>1</sup>
27	2 <sup>0</sup>
16	
11	
8	
3	
2	
1	
1	
0	

→  $11111011011_2 \# \text{ Base 2}$

$\overset{0}{\downarrow} \underline{11111} \underline{011011} = 3733_8 \#$   
                   3    7    3    3

$\overset{0}{\downarrow} \underline{11111} \underline{011011} = 7DB_{16} \#$   
                   7    D    B

b) 601

601	2 <sup>9</sup>
512	2 <sup>8</sup>
89	2 <sup>6</sup>
64	2 <sup>4</sup>
25	2 <sup>3</sup>
16	2 <sup>2</sup>
9	2 <sup>1</sup>
8	2 <sup>0</sup>
1	
1	
0	

$1001011001_2 \# \text{ Base 2}$

$\overset{00}{\downarrow\downarrow} \underline{1001} \underline{011} \underline{001} = 1131_8 \#$   
                   1    1    3    1

$\overset{00}{\downarrow\downarrow} \underline{1001} \underline{011001} = 259_{16} \#$   
                   2    5    9

4) a. BA B E 14<sub>(16)</sub>

→ Base 2 
$$\begin{array}{cccccc} \underline{1011} & \underline{1010} & \underline{1011} & \underline{1110} & \underline{0001} & \underline{0100} & \# \\ B & A & B & E & 1 & 4 & \end{array}$$

→ Base 10 
$$B \cdot 16^5 + A \cdot 16^4 + B \cdot 16^3 + E \cdot 16^2 + 1 \cdot 16^1 + 4 \cdot 16^0$$

$\begin{array}{cccccc} \uparrow & \uparrow & \uparrow & \uparrow & & \\ 11 & 10 & 11 & 15 & & \end{array}$

$= 11534336 + 655360 + 45056 + 3840 + 16 + 4$

$= 12238612 \#$

→ Base 8 
$$\begin{array}{cccccc} \underline{1011} & \underline{1010} & \underline{1011} & \underline{1110} & \underline{0001} & \underline{0100} \\ 5 & 6 & 5 & 3 & 7 & 0 & 2 & 4 \\ = 56537024_{(8)} \# \end{array}$$

b. C001

→ Base 2 
$$\begin{array}{cccc} \underline{1100} & \underline{0000} & \underline{0000} & \underline{0001} & \# \\ C & 0 & 0 & 1 & \end{array}$$

→ Base 8 
$$\begin{array}{cccc} \underline{1100} & \underline{0000} & \underline{0000} & \underline{0001} \\ 1 & 4 & 0 & 0 & 0 & 1 \\ = 140001_{(8)} \end{array}$$

→ Base 10 
$$C \cdot 16^3 + 0 \cdot 16^2 + 0 \cdot 16^1 + 1 \cdot 16^0$$

$= 49152 + 1 = 49153 \#$

5) K l o r n c h a w a l <sup>space</sup> C h a i p a h

4B 6F 72 6E 63 68 61 77 61 6C 20 43 68 61 69 70 61 68

for 1 byte (8 bits)

$$\left. \begin{array}{l} 18 \times 1 = 18 \text{ bytes} \\ 18 \times 8 = 144 \text{ bits} \end{array} \right\} \#$$

6) a) เขียน flow chart

Note: flow chart ที่ถูกส่งมาจะมีผลไม่สมบูรณ์แบบ



