Lab 1

Sunday, January 9, 2022 6:30 PM

Problem 1

Subtract the following hexadecimal numbers:

7ACD - 3AFE = ?

$$\begin{array}{r} 7\ A\ C\ D \\ -\ 3\ A\ F\ E \\ \hline \end{array}$$

Step-1 : D-E

Here D = 13 < E = 14, we take/borrow from C

So C = 12 becomes 11 and D = 13 becomes 13 + 16 = 29

= 29 - 14

= 15

= F_{16}

$$\begin{array}{r} 7\ A\ \overset{11}{\not{C}}\ \overset{29}{\not{D}} \\ -\ 3\ A\ F\ E \\ \hline F \end{array}$$

Step-2 : B - F

Here B = 11 < F = 15, we take/borrow from A

So A = 10 becomes 9 and B = 11 becomes 11 + 16 = 27

= 27-15

= 12

= C_{16}

$$\begin{array}{r} 7\ \overset{9}{\not{A}}\ \overset{27}{\not{C}}\ \overset{29}{\not{D}} \\ -\ 3\ A\ F\ E \\ \hline C\ F \end{array}$$

Step-3: 9 - A

Here 9 < A = 10, we take/borrow from 7

So 7 becomes 6 and 9 becomes 9 + 16 = 25

= 25 - 10

= 15

= F_{16}

$$\begin{array}{r} {\scriptstyle 25\ \ 27} \\ 6\ \not{9}\ \not{H}\ {\scriptstyle 29} \\ \not{7}\ \not{A}\ \not{C}\ \not{D} \\ -\ 3\ A\ F\ E \\ \hline F\ C\ F \end{array}$$

Step-4: 6 - 3

Here 6 > 3, so directly subtract it

= 6 - 3

= 3

= 3_{16}

$$\begin{array}{r} {\scriptstyle 25\ \ 27} \\ 6\ \not{9}\ \not{H}\ {\scriptstyle 29} \\ \not{7}\ \not{A}\ \not{C}\ \not{D} \\ -\ 3\ A\ F\ E \\ \hline 3\ F\ C\ F \end{array}$$

Problem 2

Convert 01110110 into 2's Complement form.

Convert 01110110 into 2's Complement form.

1) Flip all bits...

10001001 (This is 1's complement)

2) Add 1 to the 1's complement

$$\begin{array}{r} 1\ 0\ 0\ 0\ 1\ 0\ 0\ 1 \\ +\quad\quad\quad 1 \\ \hline 1\ 0\ 0\ 0\ 1\ 0\ 1\ 0 \end{array}$$

(This is 2's complement)

Problem 3

Subtract the following Octal numbers:

765 - 377 = ?

$$\begin{array}{r} 7\ 6\ 5 \\ -\ 3\ 7\ 7 \\ \hline \end{array}$$

Step-1 : 5 - 7

Here 5 < 7, we take/borrow from 6

So 6 becomes 5 and 5 becomes 5 + 8 = 13

= 13 - 7

= 6_8

$$\begin{array}{r} \quad 5\ 13 \\ 7\ 6\ \not{5} \end{array}$$

$$
\begin{array}{r}
\;\;5\;\;13 \\
7\;\;\not{6}\;\;\not{5} \\
-\;\;3\;\;7\;\;7 \\
\hline
6
\end{array}
$$

Step-2: 5 - 7

Here 5 < 7, we take/borrow from 7

So 7 becomes 6 and 5 becomes 5+8 = 13

= 13 - 7

= 6_8

$$
\begin{array}{r}
\;\;13\;\; \\
6\;\;\not{5}\;\;13 \\
\not{7}\;\;\not{6}\;\;\not{5} \\
-\;\;3\;\;7\;\;7 \\
\hline
6\;\;6
\end{array}
$$

Step-3: 6-3

Here 6 > 3, so directly subtract it

= 6 - 3

= 3_8

$$
\begin{array}{r}
\;\;13\;\; \\
6\;\;\not{5}\;\;13 \\
\not{7}\;\;\not{6}\;\;\not{5}
\end{array}
$$

$$\begin{array}{r} -377 \\ \hline 366 \end{array}$$