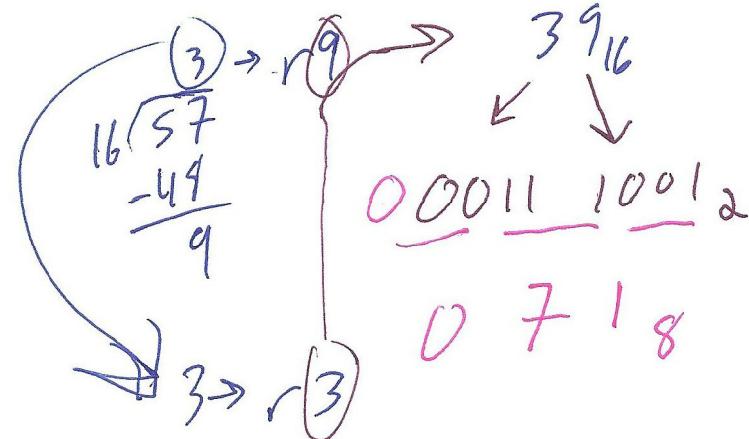


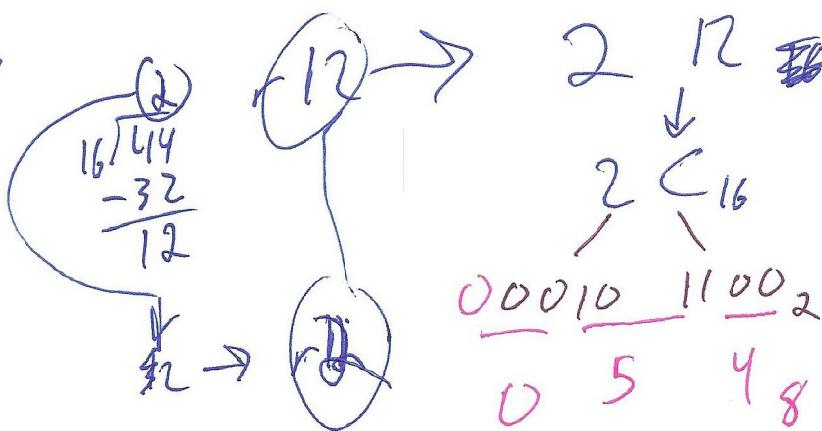
$S7_{10}$

Lab 1

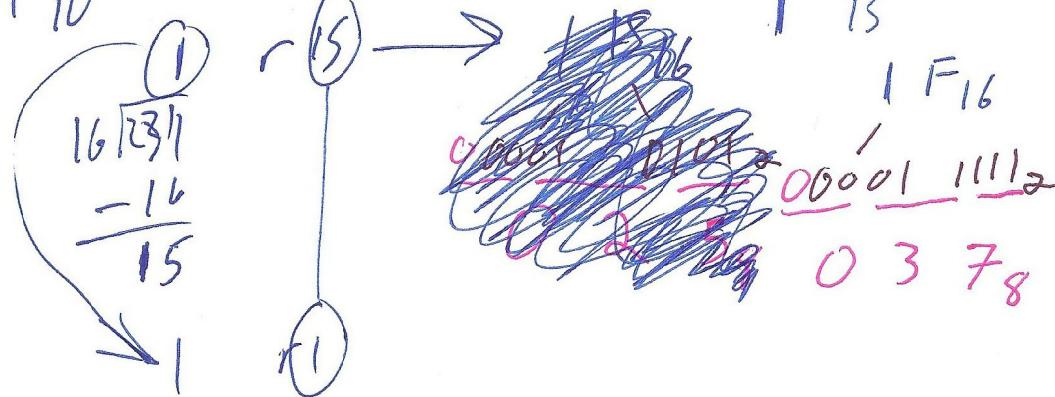
09-15-14



$S7_{10}$
$0011\ 1001_2$
07_{18}
39_{16}

 44_{10} 

44_{10}
$0010\ 1100_2$
054_{18}
$2C_{16}$

 31_{10} 

31_{10}
$0001\ 1111_2$
037_{18}
$1F_{16}$

 15_{10}

$$16 \overline{)15}^0 \quad r15 \rightarrow$$

$$\begin{array}{r} 15 \\ \downarrow \\ F_{16} \\ \hline 17_8 \end{array}$$

15_{10}
1111_2
17_8
F_{16}

P61

-44_{10}

Lab 1

09-15-14

$$44_{10} \rightarrow \begin{array}{r} 2 \\ 16 \overline{)44} \\ -32 \\ \hline 12 \end{array} \quad \begin{array}{c} r12 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \end{array} \quad \begin{array}{c} 12 \\ C16 \\ 0010 \quad 1100_2 \\ \leftarrow 44_{10} \end{array}$$

$$\begin{array}{r} 2 \\ 2 \\ r2 \\ 2 \\ 2 \end{array} \quad \begin{array}{r} 1101 \quad 0011 \\ + 0000 \quad 0001 \\ \hline 1101 \quad 0100 \end{array} \quad \begin{array}{l} \text{ones complement} \\ \text{signal} \\ \leftarrow \text{Two's complement} \end{array}$$

$D\ 4_{16}$

So... -44_{10} is

$D\ 4_{16} \quad \{ \quad 1101 \quad 0100_2$

-15_{10}

$$15_{10} \rightarrow \begin{array}{r} D \\ 16 \overline{)15} \end{array} \quad r15 \rightarrow 015 \\ OF_{16}$$

$0000 \quad 1111_2$

$$\begin{array}{r} 1111 \quad 0000 \\ + 0000 \quad 0001 \\ \hline 1111 \quad 0001 \end{array} \quad \begin{array}{l} \text{ones complement} \\ \text{Two's complement} \end{array}$$

$F\ 1_{16}$

So...

-15_{10} is $F1_{16} \neq 1111 \quad 0001_2$

P62

Calculate

$$57_{10} - 44_{10}$$

$$57_{10} = 10011_2$$

$$0 \quad 37_8$$

$$39_{16}$$

Lab 1
09-15-14

$$\begin{array}{r} -44_{10} = \\ \hline 324_8 \\ D4_{16} \end{array}$$

$$\begin{array}{r} 57_{10} \\ + (-44_{10}) \\ \hline 13_{10} \end{array}$$

$\xrightarrow{\text{①}} \begin{array}{r} 111 \\ 0011 \\ 1001 \end{array}$
 $\xrightarrow{\text{②}} \begin{array}{r} 1101 \\ 1101 \\ 0100 \end{array}$
 $\hline 0000 \quad 1101$
 $0 \quad D$
 013_{10}

So... $\begin{array}{r} 57 \\ + (-44) \\ \hline 13 \end{array}$

$$\begin{array}{r} 0011 \quad 1001 \\ + 1101 \quad 0100 \\ \hline 0000 \quad 1101 \end{array}$$

$\xrightarrow{\text{D}}$
 $0 \quad D$
 013

$$\begin{array}{r} 57_{10} \\ - 44_{10} \\ \hline 13_{10} \end{array} \quad \text{or} \quad \begin{array}{r} 0011 \quad 1001 \\ + 1101 \quad 0100 \\ \hline 0000 \quad 1101_2 \end{array} \quad \begin{array}{r} 39_{16} \\ D4_{16} \\ \hline 0D_{16} \end{array}$$

Calculate $31_{10} - 15_{10}$

$$\begin{array}{r} 31_{10} \\ - 15_{10} \\ \hline 16_{10} \end{array}$$

$$31_{10} = 1111_2$$

$$-15 = 1110001$$

$$0 \quad 37_8$$

$$F_{16}$$

So... $\begin{array}{r} 31_{10} \\ + (-15_{10}) \\ \hline 16_{10} \end{array}$

$$\begin{array}{r} 1111 \quad 0001 \\ + 1111 \quad 0001 \\ \hline 0001 \quad 0000 \end{array}$$

$\xrightarrow{\text{1}} \quad \xrightarrow{\text{0}_{16}}$
 16_{10}

$$\begin{array}{r} 31_{10} \\ - 15_{10} \\ \hline 16_{10} \end{array} \quad \text{or} \quad \begin{array}{r} 0001 \quad 1111 \\ + 1111 \quad 0001 \\ \hline 0001 \quad 0000_2 \end{array} \quad \begin{array}{r} 1F_{16} \\ F1_{16} \\ \hline 10_{16} \end{array}$$

D <small>ata</small>	D <small>ata</small>	D <small>ata</small>	D <small>ata</small>
0000	00	000	00
0001	01	001	1
0010	02	002	2
0011	03	003	3
100	04	004	4
101	05	005	5
110	06	006	6
111	07	007	7
000	08	010	8
001	09	011	9
010	10	012	A
011	11	013	B
100	12	014	C
101	13	015	D
110	14	016	E
111	15	017	F

$$2^3 = 8$$

Lab 1
09-15-14

$$\begin{array}{r}
 16^8 \quad 16 \cdot 16 \cdot 16 \cdot 16 \quad 16 \cdot 16 \cdot 16 \cdot 16 \\
 16^7 \quad 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 = 268435456 \\
 16^6 \quad 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \quad 16777216 \\
 16^5 \quad 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \quad 1649576 \\
 16^4 \quad 16 \cdot 16 \cdot 16 \cdot 16 \quad 65536 \\
 16^3 \quad 16 \cdot 16 \cdot 16 \quad 4096 \\
 16^2 \quad 16 \cdot 16 \quad 256 \\
 16^1 \quad 16 \quad 16
 \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ \frac{1}{2} \\ \hline \frac{1}{2} \end{array} .25$$

$$2^{-4} \frac{1}{2 \cdot 2 \cdot 2 \cdot 2} = 0.0625$$

$$S = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2} . 6$$

$$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 0.15625$$

$$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 0.0078125$$

$$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 0.00390625$$

1 .00 1953125

-10 1 .000976562

$$2^2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$\begin{array}{r}
 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \checkmark 64 \\
 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \checkmark 32 \\
 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \checkmark 16 \\
 2 \cdot 2 \cdot 2 \cdot 2 \checkmark 8 \\
 2 \cdot 2 \cdot 2 \checkmark 4 \\
 2 \cdot 2 \checkmark 2 \\
 2 \checkmark 1
 \end{array}$$

1 16 16
 2 16 + 16 32
 3 16 + 16 + 16 48
 4 16 + 16 + 16 + 16 64
 5 16 + 16 + 16 + 16 + 16 80
 6 16 + 16 + 16 + 16 + 16 + 16 96
 7 16 + 16 + 16 + 16 + 16 + 16 + 16 112
 8 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 128
 9 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 144
 10 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16 160

$16^{-1} \frac{1}{16} 0.0625$ Lab 1
 $16^{-2} \frac{1}{16 \cdot 16} 0.00390625$ 09-15-14
 $16^{-3} \frac{1}{16 \cdot 16 \cdot 16} 0.00024414062$
 $16^{-4} \frac{1}{16 \cdot 16 \cdot 16 \cdot 16} 0.00001525878$
 $16^{-5} \frac{1}{16 \cdot 16 \cdot 16 \cdot 16 \cdot 16} 0.000000953674316$
 $16^{-6} \frac{1}{16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16} 0.0000000596046448$
 $16^{-7} \frac{1}{16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16} 0.0000000037252903$
 $16^{-8} \frac{1}{16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16 \cdot 16} 0.00000000023243064$
 $16^{-9} \frac{1}{16 \cdot 16 \cdot 16} 0.00000000009094947$
 $16^{-10} \frac{1}{16 \cdot 16 \cdot 16} 0.0000000000009094947$

1. 2 -2
 2. 2+2 -4
 3. 2+2+2 -6
 4. 2+2+2+2 -8
 5. 2+2+2+2+2 -10
 6. 2+2+2+2+2+2 -12
 7. 2+2+2+2+2+2+2 -14
 8. 2+2+2+2+2+2+2+2 -16
 9. 2+2+2+2+2+2+2+2+2 -18
 10. 2+2+2+2+2+2+2+2+2+2 -20