

Keith Kurtz
 CS 42
 Assig. 6

4-3)

unsigned	1001 1100	10011101	10101000
1's complement	0110 0011	01100010	01010111
2's complement	0110 0100	01100011	01011000

unsigned	0000 0000	1000 0000
1's complement	1111 1111	0111 1111
2's complement	0000 0000	1000 0000

4-4) a) $11010 - 10001$
 01110 1's comp.
 01111 2's comp.

$$\begin{array}{r} 11010 \\ + 01111 \\ \hline 01001 \end{array}$$

b) $11110 - 01110$
 10001 1's comp.
 10010 2's comp.

$$\begin{array}{r} 11110 \\ + 10010 \\ \hline 10000 \end{array}$$

c) $1111110 - 1111110$
 0000001 1's comp.
 0000010 2's comp.

$$\begin{array}{r} 1111110 \\ + 0000010 \\ \hline 0000000 \end{array}$$

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4-4) (cont.)

d)

$$\begin{array}{r}
 101001 - 000101 \\
 \hline
 111010 \quad \text{1's comp.} \\
 111011 \quad \text{2's comp.}
 \end{array}$$

$$\begin{array}{r}
 101001 \\
 + 111011 \\
 \hline
 100100
 \end{array}$$

4-6)

$$\begin{aligned}
 +36 &= 32 + 4 = 2^5 + 2^2 = 0100100 \\
 +24 &= 16 + 8 = 2^4 + 2^3 = 0011000 \\
 +24 &= 1101000 \\
 +35 &= 32 + 2 + 1 = 2^5 + 2 + 1 = 0100011 \\
 -35 &= 1011101
 \end{aligned}$$

$$\begin{array}{r}
 36 \\
 + (-24) \\
 \hline
 = 12
 \end{array}
 \qquad
 \begin{array}{r}
 0100100 \\
 + 1101000 \\
 \hline
 10001100 \\
 = 0001100
 \end{array}$$

$$\begin{array}{r}
 -35 \\
 - (-24) \\
 \hline
 = -11
 \end{array}
 \qquad
 \begin{array}{r}
 1011101 \\
 + 0011000 \\
 \hline
 1110101
 \end{array}$$

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$$\begin{array}{r} 4-7 \text{ a) } \quad 100111 \quad -25 \\ + 111001 \quad -7 \\ \hline 100000 \quad -32 \end{array}$$

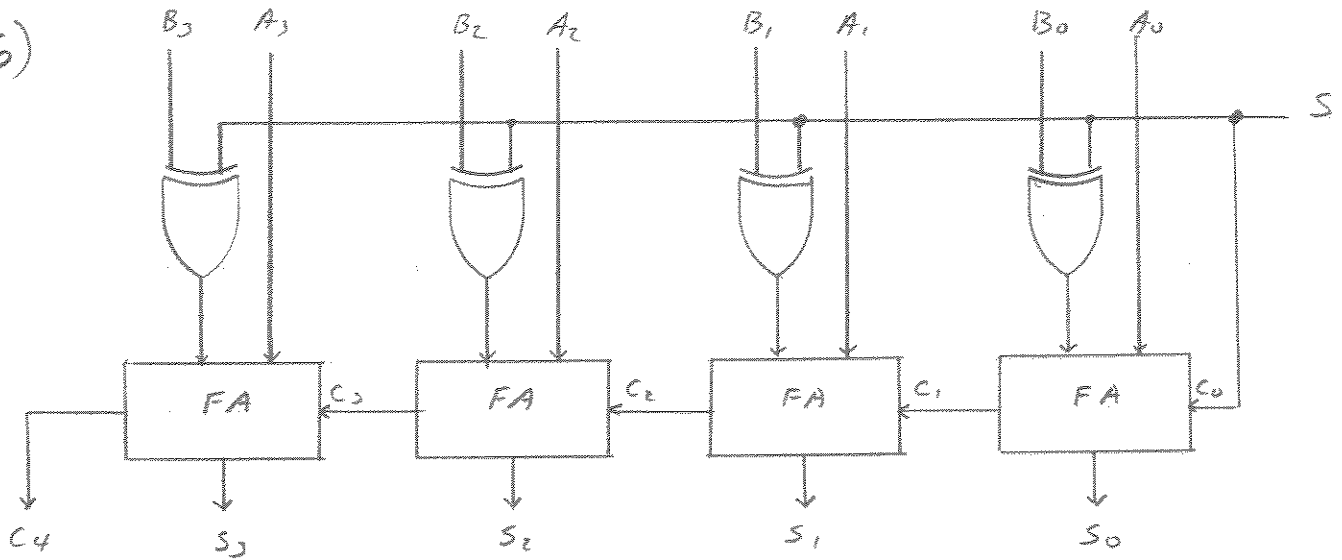
$$\begin{array}{r} \text{b) } \quad 001011 \quad 11 \\ + 100110 \quad -26 \\ \hline 110001 \quad -15 \end{array}$$

$$\begin{array}{r} \text{c) } \quad 110001 \quad -15 \\ + 101110 \quad -18 \\ \hline 011111 \quad -33 \end{array} \quad \text{OVERFLOW}$$

$$\begin{array}{r} \text{d) } \quad 101110 \quad -18 \\ + 001001 \quad 9 \\ \hline 110111 \quad -9 \end{array}$$

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4-16)



NOTE: $S=0 \Rightarrow$ Addition, $S=1 \Rightarrow$ Subtraction

a)
$$\begin{array}{r} 0111 \\ + 0111 \\ \hline 01110 \\ C_4 S_3 S_2 S_1 S_0 \end{array}$$

b)
$$\begin{array}{r} 0100 \\ - 0111 \\ \hline 0100 \\ + 1001 \\ \hline 01101 \\ C_4 S_3 S_2 S_1 S_0 \end{array} \rightarrow$$

c)
$$\begin{array}{r} 1101 \\ - 1010 \\ \hline 1101 \\ + 0110 \\ \hline 10011 \\ C_4 S_3 S_2 S_1 S_0 \end{array} \rightarrow$$

d)
$$\begin{array}{r} 0111 \\ + 1010 \\ \hline 10001 \\ C_4 S_3 S_2 S_1 S_0 \end{array}$$

e)
$$\begin{array}{r} 0001 \\ - 1000 \\ \hline 0001 \\ + 1000 \\ \hline 01001 \\ C_4 S_3 S_2 S_1 S_0 \end{array} \rightarrow$$

	S	A	B	C ₄	S ₃	S ₂	S ₁	S ₀
a	0	0111	0111	0	1	1	1	0
b	1	0100	0111	0	1	1	0	1
c	1	1101	1010	1	0	0	1	1
d	0	0111	1010	1	0	0	0	1
e	1	0001	1000	0	1	0	0	1