

Keith Kurtz
 CS 42
 Assig. 6

1) 3)	a)	b)	c)
unsigned	1001 1100	10011101	10101000
is complement	0110 0011	01100010	01010111
2's complement	0110 0100	01100011	01011000

	d)	e)
unsigned	0000 0000	1000 0000
is complement	1111 1111	0111 1111
2's complement	0000 0000	1000 0000

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

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

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

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

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

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

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2) (cont.)

d) $101001 - 111011$
 $101001 - 000101$
 0111010 1's comp.
 111011 2's comp.

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

3) a)

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

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

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

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

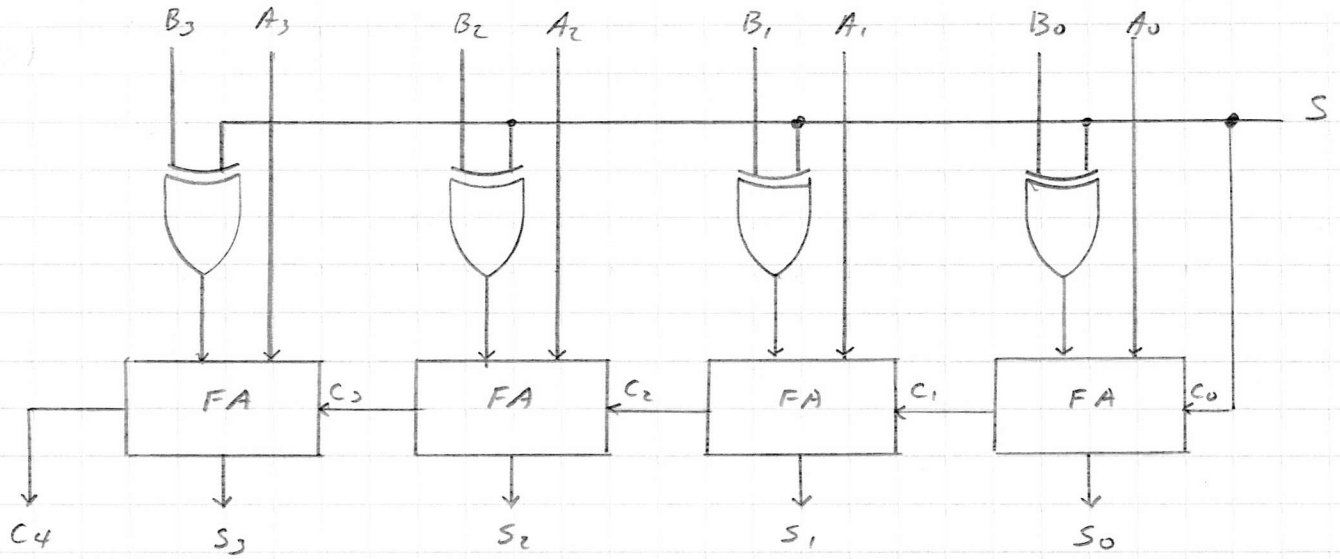
$$\begin{array}{r} b) \quad 001011 \\ + 100110 \\ \hline 110001 \end{array} \quad \begin{array}{r} 11 \\ -26 \\ \hline -15 \end{array}$$

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

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

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5)



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

a)
$$\begin{array}{r} 0111 \\ + 0111 \\ \hline 0110 \end{array}$$

 $C_4 \ S_3 \ S_2 \ S_1 \ S_0$

b)
$$\begin{array}{r} 0100 \\ - 0111 \\ \hline 0100 \\ + 1001 \\ \hline 01101 \end{array}$$

 $C_4 \ S_3 \ S_2 \ S_1 \ S_0$

c)
$$\begin{array}{r} 1101 \\ - 1010 \\ \hline 1101 \\ + 0110 \\ \hline 10011 \end{array}$$

 $C_4 \ S_3 \ S_2 \ S_1 \ S_0$

d)
$$\begin{array}{r} 0111 \\ + 1010 \\ \hline 10001 \end{array}$$

 $C_4 \ S_3 \ S_2 \ S_1 \ S_0$

e)
$$\begin{array}{r} 0001 \\ - 1000 \\ \hline 0001 \\ + 1000 \\ \hline 01001 \end{array}$$

 $C_4 \ S_3 \ S_2 \ S_1 \ S_0$

	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