3-50

We can easily have:

$$\overline{AB}(A+B) = (\bar{A}+\bar{B})(A+B) = A\bar{B}+\bar{A}B = A\bigoplus B$$

So from the logic diagram we can have:

$$S_0 = C_0\bigoplus(\overline{A_0B_0}(A_0+B_0)) = C_0\bigoplus A_0\bigoplus B_0$$

Also

$$C_0 = \overline{\overline{A_0+B_0}+(\overline{A_0B_0})\bar{C_0}} = A_0B_0+(A_0+B_0)C_0$$

So it is a full adder.

3-51

1001 1100

1's complement: 0110 0011

2's complement: 0110 0100

1001 1101

1's complement: 0110 0010

2's complement: 0110 0011

1010 1000

1's complement: 0101 0111

2's complement: 0101 1000

0000 0000

1's complement: 1111 1111

2's complement: 0000 0000

1000 0000

1's complement: 0111 1111

2's complement: 1000 0000

3-52

(a)

    11010 - 10001
= 11010 + 01111
= 01001

(b)

    11110 - 1110
= 11110 - 01110
= 11110 + 10010
= 10000

(c)

    1111 110 - 1111 110
= 0000 000

(d)

    1010 01 - 101
= 1010 01 - 0001 01
= 1010 01 + 1110 11
= 1001 00

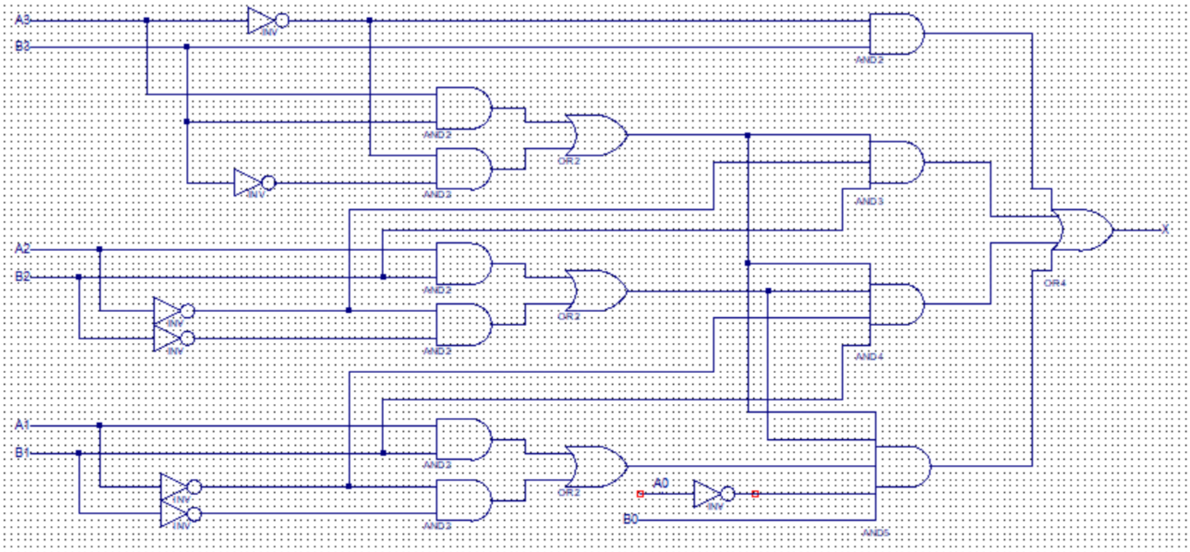
3-59

Starting from the the highest digit, compare the digits of A and B one by one.

Or we can consider an extension of A and B, with 2's complement we can apply subtraction of two signed numbers.

For the first method:

$$
\begin{aligned}
X = \overline{A_3}B_3 + (A_3B_3 + \overline{A_3}\,\overline{B_3})\overline{A_2}B_2 \\
+ (A_3B_3 + \overline{A_3}\,\overline{B_3})(A_2B_2 + \overline{A_2}\,\overline{B_2})\overline{A_1}B_1 \\
+ (A_3B_3 + \overline{A_3}\,\overline{B_3})(A_2B_2 + \overline{A_2}\,\overline{B_2})(A_1B_1 + \overline{A_1}\,\overline{B_1})\overline{A_0}B_0
\end{aligned}
$$



A3
B3
A2
B2
A1
B1
A0
B0
X