

Problem Set:

Question 1

Complete the number conversions indicated. Note that all binary numbers are two's complement representations.

$$-19_D = \underline{11101101}_B$$
$$\underline{-106}_D$$

$$10011010_B =$$

$$10000000_B = \underline{-128}_D$$

$$-101_D = \underline{10011011}_B$$

Question 2

Complete the two 2's complement arithmetic problems below assuming that all operations use an adder. Showing both the decimal and binary numbers in each case.

$$\begin{array}{r} 17 \\ -11 \\ \hline \end{array} \quad \begin{array}{r} 00010001 \\ + 11110101 \\ \hline \end{array}$$

$$\begin{array}{r} -22 \\ + 6 \\ \hline \end{array} \quad \begin{array}{r} 11101010 \\ + 00000110 \\ \hline \end{array}$$

Handwritten work for the first problem:

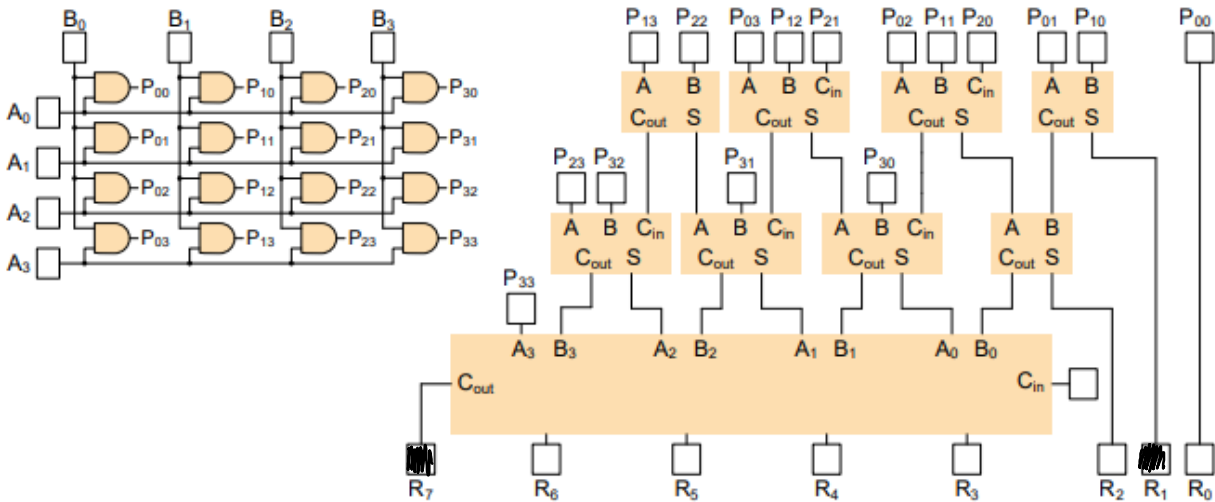
$$\begin{array}{r} 17 \rightarrow 000010001 \\ -11 \rightarrow 111110101 \\ +6 \rightarrow 000000110 \\ \hline 1000000110 \rightarrow 6(10) \end{array}$$

Handwritten work for the second problem:

$$\begin{array}{r} -22 \rightarrow 11101010 \\ + 6 \rightarrow 00000110 \\ -16 \rightarrow 11110000 \rightarrow (-16)_B \\ \hline 11100000 \xrightarrow{2's} 00010000 = (16) \\ (11100000) \xrightarrow{2's} (-16)_B \end{array}$$

Question 3

Fill in the squares below to show all signal values when $A = "1101"$ and $B = "1010"$ are multiplied.



R0	R1	R2	R3	R4	R5	R6	R7
0	1	0	0	0	0	0	1

Multiplying we get 01000001

R7 → MSB, R0 → LSB