



Week 4 Review



Problem Set 03

Questions

1. Convert the following decimal values to 2's complement number:

- $-89 = 10100111$ ($89 = 01011001$)
- $-62 = 11000010$ ($62 = 00111110$)

2. Convert the following 2's complement number to its decimal equivalent

- $10110011 = -77$ ($01001101 = 77$)
- $10000011 = -125$ ($01111101 = 125$)

Questions

3. Perform binary subtraction on these two numbers: 103 and 69. Show the steps.

$$103 = 01100111$$

$$69 = 01000101$$

$$-69 = 10111011$$

■ $103 - 69$

$$\begin{array}{r} 01100111 \\ -01000101 \\ \hline \end{array}$$



$$\begin{array}{r} 01100111 \\ +10111011 \\ \hline 100100010 \end{array}$$



$$00100010 = 34_{10}$$

Question 4: Full Adder

x	y	z	c	s
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

Simplify the following two equations so that they use at least one XOR gate (\oplus):

$$\begin{aligned}C &= \sum(3,5,6,7) \\&= X'YZ' + X'YZ + XY'Z' + XYZ \\&= X'(Y'Z + YZ') + X(Y'Z' + YZ) \\&= X'(Y \oplus Z) + X(Y \oplus Z) \\&= X \oplus Y \oplus Z\end{aligned}$$

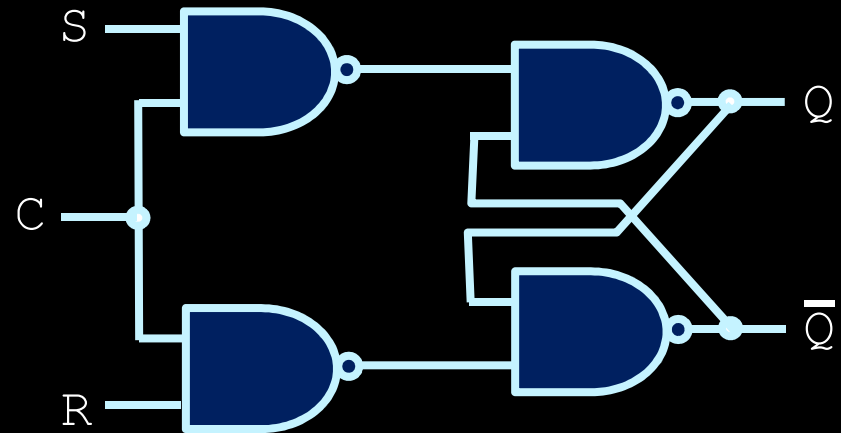
$$\begin{aligned}S &= \sum(1,2,4,7) \\&= X'YZ + XY'Z + XYZ' + XYZ \\&= (X'Y + XY')Z + XY(Z' + Z) \\&= (X \oplus Y)Z + XY\end{aligned}$$



Problem Set 04

Question 1

- What are the output values from Q and \bar{Q} given the following inputs on S , R and C ?

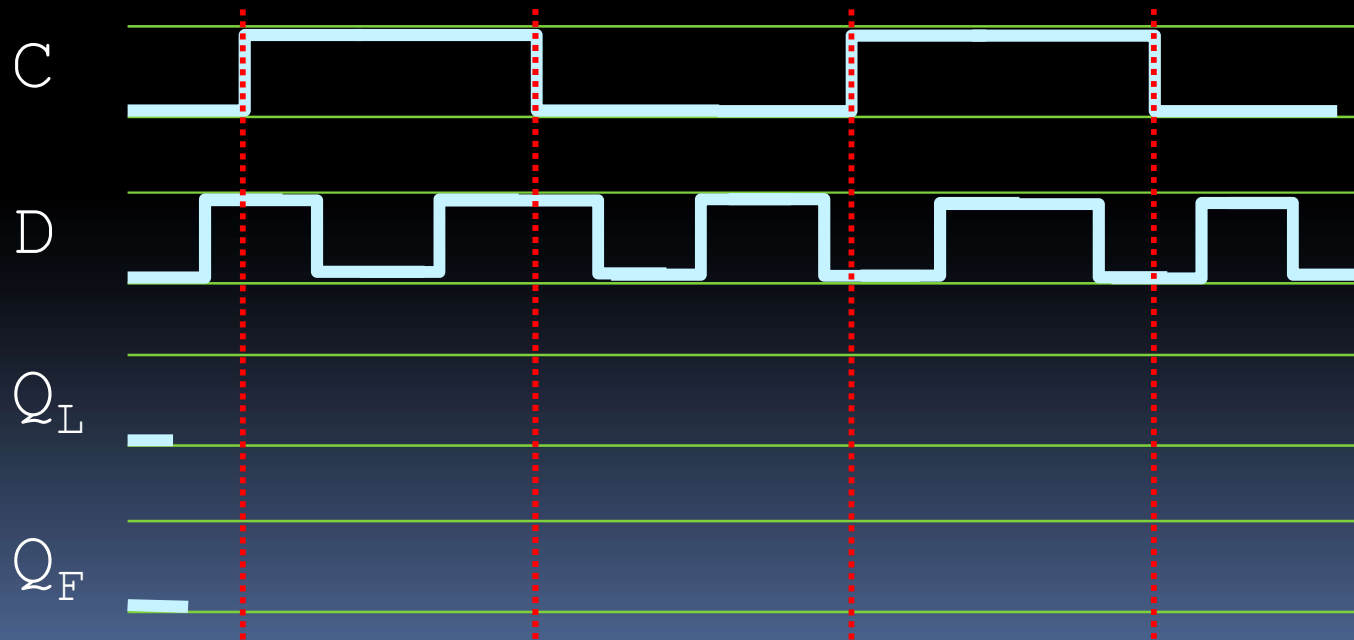
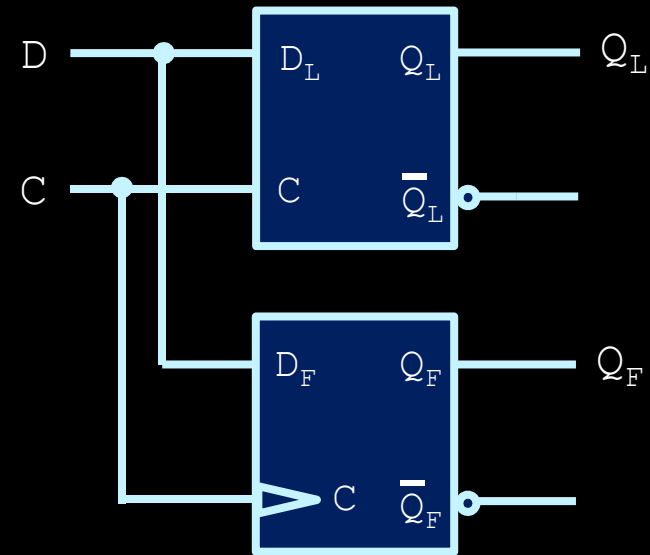


Time

S	R	C	Q	\bar{Q}
0	0	1		
1	0	1		
1	0	0		
0	0	0		
0	1	0		
0	1	1		

Question 2

- Given the circuit on the right and the input waveform below, what will the outputs be on Q_L and Q_F ?
 - What other info do you need?



Question 3

- Assuming the Q outputs of both flip-flops start off low, what will the value of X & Y be over the next few clock cycles?
 - also assume positive edge trigger.

