Mark Iskandar
Nathan Tung

EE M116L Prelab #1

1. Do research and write a **brief** report on how to read the coded values of resistors and capacitors.

Coded values on resistors can be determined by the colored bands on it. There are typically four bands: the first three bands represent the first significant figure of the value (10s), second significant figure of the value (1s), and exponent multiplier, respectively. The fourth and last band represents the tolerance (or precision) of the resistance.

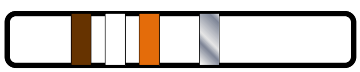
Color-to-value representations are shown in the table below:

Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Gray	White
0	1	2	3	4	5	6	7	8	9

Similarly, a sample of color-to-tolerance representations are shown below:

Gold	Silver	None
5%	10%	20%

For example, a sequence of bands such as “Brown-White-Orange-Silver” (shown below) translates to:



$$19 \cdot 10^3\ \Omega = 19\ k\Omega \pm 10\%$$

Breaking that down, we know that “Brown-White” has a 1 (from Brown) in the 10s place and a 9 (from White) in the 1s place. The exponent is 3 (Orange) and the precision is 10% (Silver).

On the other hand, some capacitors actually have the capacitance printed on the side.
But capacitors often have four or more bands, just like resistors, or three digits followed by a letter representing the tolerance.

In the former case, the first three numbers again represent the first and second significant figures of the value, followed by the exponent multiplier. We use the same color-to-value chart used in calculating resistance (shown above). For the fourth and last color band, we use a new color-to-tolerance chart, a sample of which is shown below:

Black	Brown	Red	Green	Gold	Silver
20%	1%	2%	0.5%	5%	10%

If we were to use the same sequence of bands (“Brown-White-Orange-Silver”) but on a capacitor, we would obtain the same value in picofarads.

$$19 \cdot 10^3\ \text{pF} = 0.019\ \mu F \pm 10\%$$

In the latter case, the three numbers work in the same way as resistor colors. The first two numbers represent the first and second significant figures of the value, and the third number is the exponent multiplier (all in picofarads, or pF). Some of the tolerance letters include K ($\pm$10%), M ($\pm$20%), and J ($\pm$5%). For example, a value of 213K translates to:

$$21 \cdot 10^3\ pF = 0.021\ \mu F \pm 10\%$$

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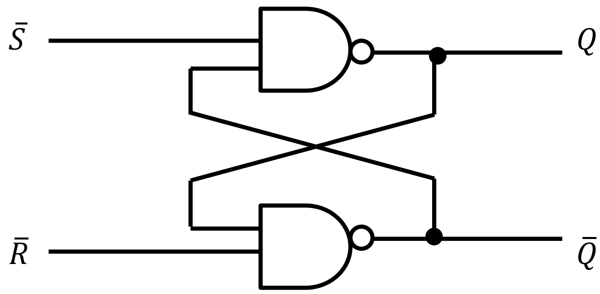
1. Draw the architecture of an SR-Latch (not an SR Flip-Flop) and include its truth table.



S	R	Q^+	$\bar{Q}^+$	Function
0	0	X	X	Indeterminate
0	1	1	0	Set
1	0	0	1	Reset
1	1	Q	$\bar{Q}$	No Change

2. Work on the K-Map of the 7-Segment decoder in Exercise 8.

	4-bit input				**7-segment output**						
decimal	**sw3 (D)**	**sw2 (C)**	**sw1 (B)**	**sw0 (A)**	**a**	**b**	**c**	**d**	**e**	**f**	**g**
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1
-	-	-	-	-	-	-	-	-	-	-	-

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a

DC \ BA	00	01	11	10
00	1	0	1	1
01	1	1	1	1
11	-	-	-	-
10	1	1	-	-

b

DC \ BA	00	01	11	10
00	1	1	1	1
01	1	0	1	0
11	-	-	-	-
10	1	1	-	-

c

DC \ BA	00	01	11	10
00	1	1	1	0
01	1	1	1	1
11	-	-	-	-
10	1	1	-	-

d

DC \ BA	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	-	-	-	-
10	1	1	-	-

e

DC \ BA	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	-	-	-	-
10	1	0	-	-

f

DC \ BA	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	-	-	-	-
10	1	1	-	-

g

DC \ BA	00	01	11	10
00	0	0	1	1
01	1	1	0	1
11	-	-	-	-
10	1	1	-	-

Sum of Products:

a = C’A’ + D + B + CA

b = D + C’ + B’A’ + BA

c = D + B’ + A + C

d = C’A’ + D + CB’A + BA’ + C’B

e = BA’ + C’B’A’

f = D + C’B’A’ + CB’ + CA’

g = D + CB’ + BA’ + C’B