

1204 - Digital Systems Design Lab

(Spring 2020)

Tutorial 4 - BCD to 7-segment

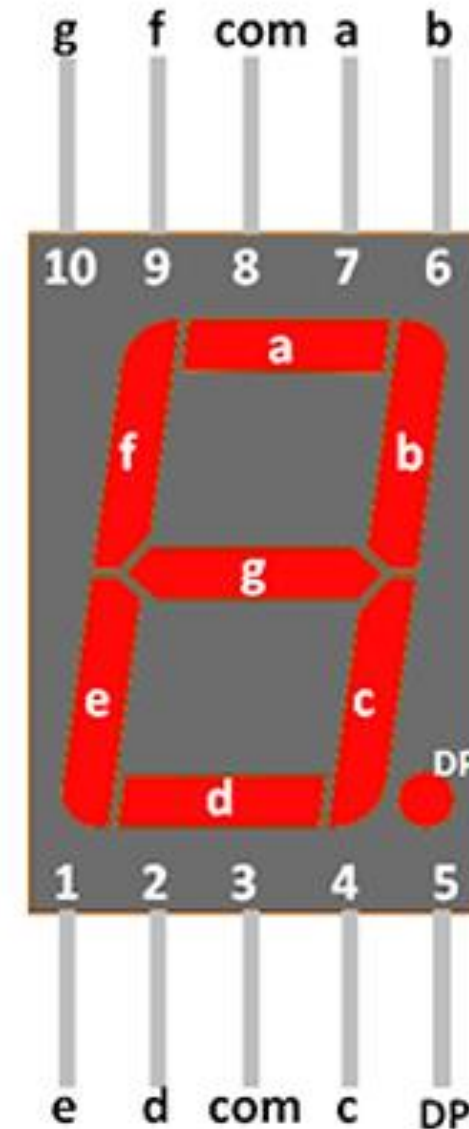
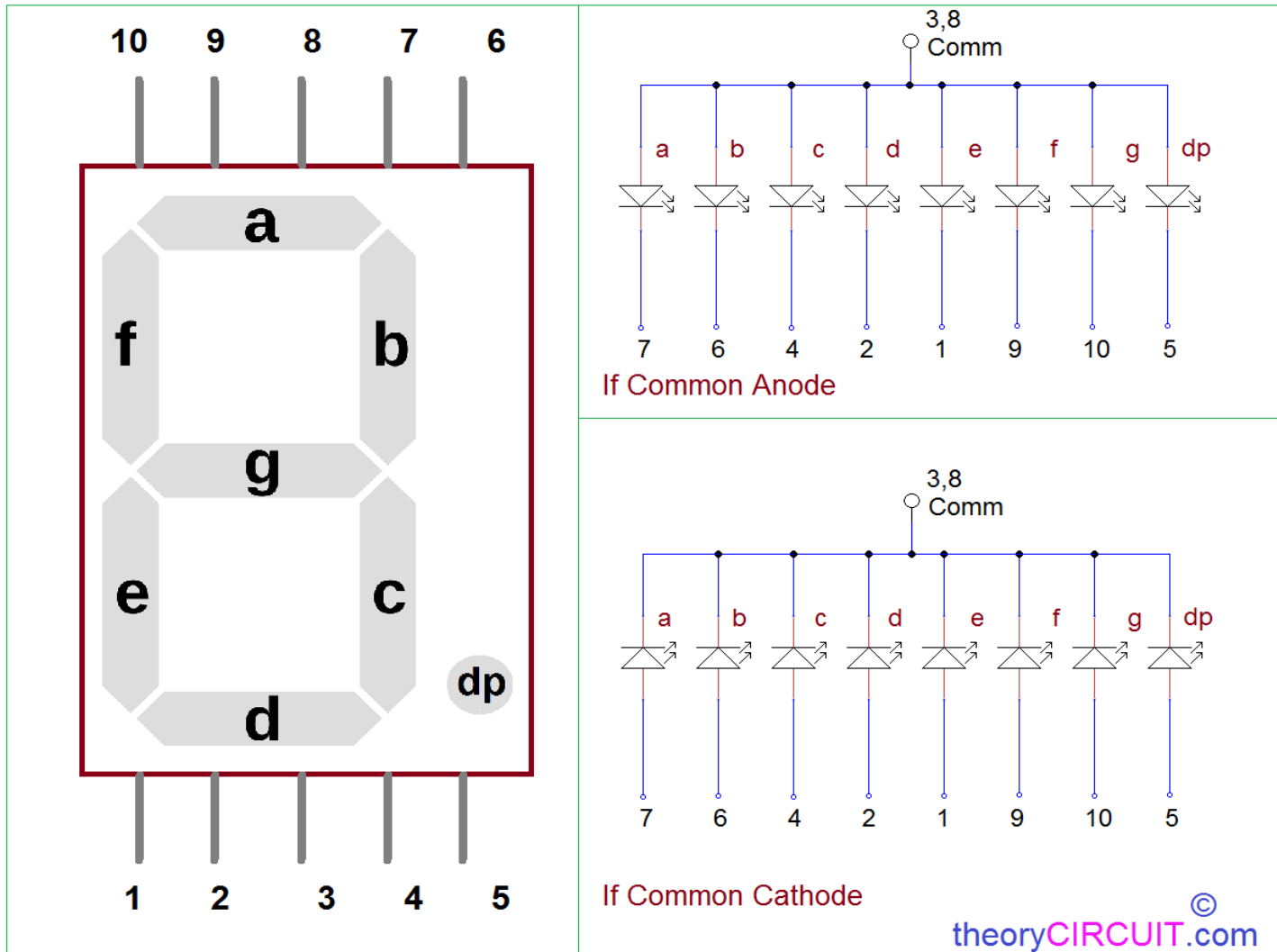
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7 Segment Display Pinout

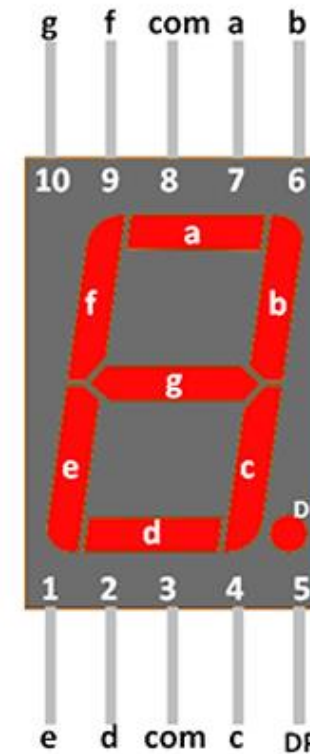
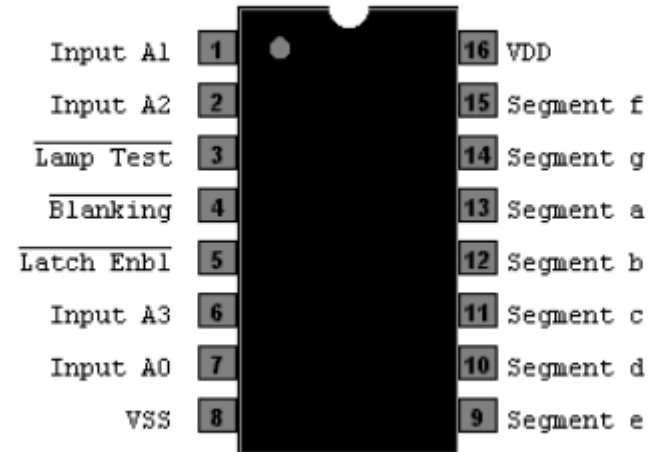


- ▶ The display consists of 7 LED segments, that have either a common anode connected to (+) or a common cathode connected to (-).



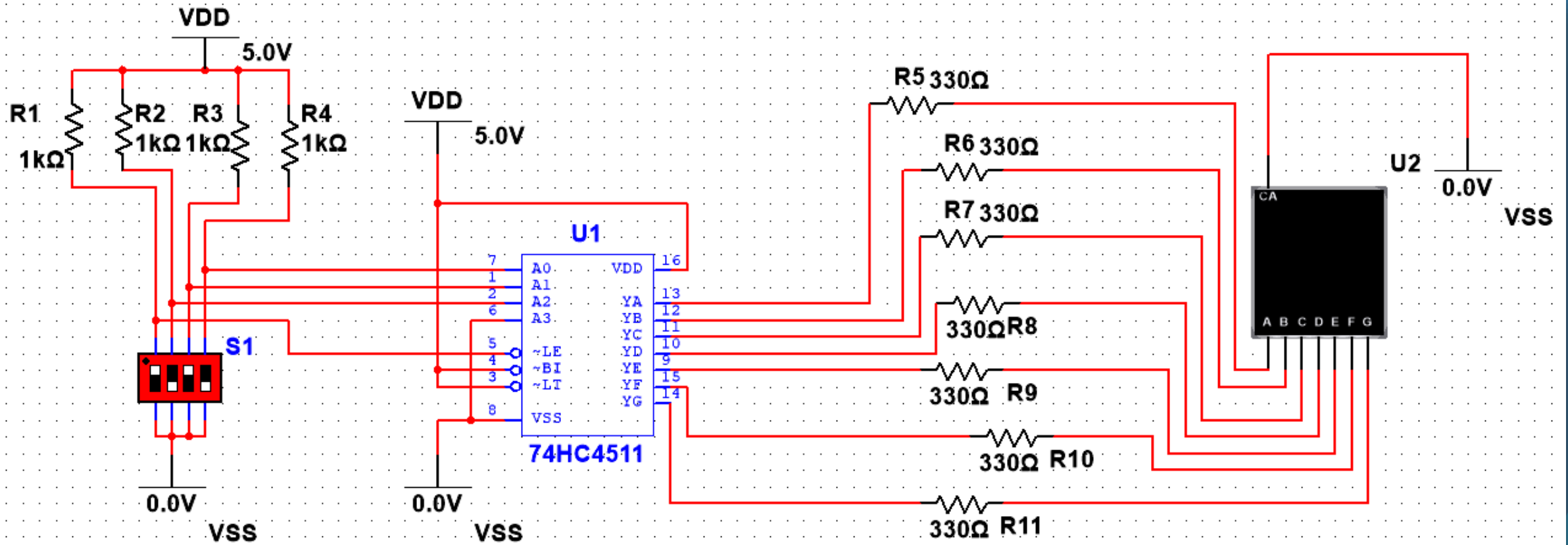
Decimal digit	BCD			
	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

A3 | A2 | A1 | A0



- ▶ The 74HC4511 (or CD4511) is a 4-digit BCD to 7-Segment decoder
- ▶ It can decode a binary representation of a number 0-9 to a set of 7 LOW/HIGH signals for segments a-f.





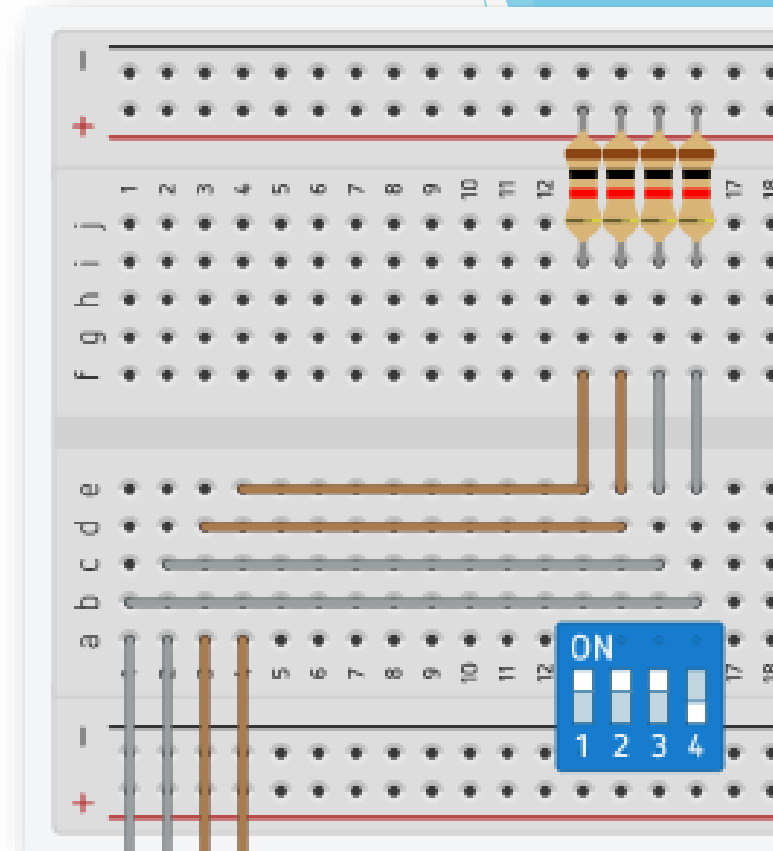
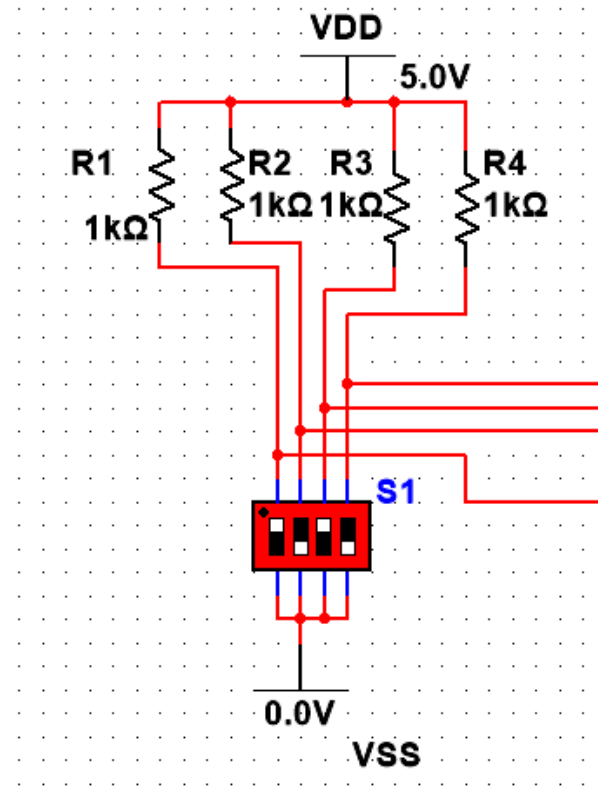
- ▶ To implement this schematic you should focus to its 4 parts.
 - switches, resistors for segments, 7-segment display, decoder IC.



1) Switches

Decimal digit	BCD			
	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

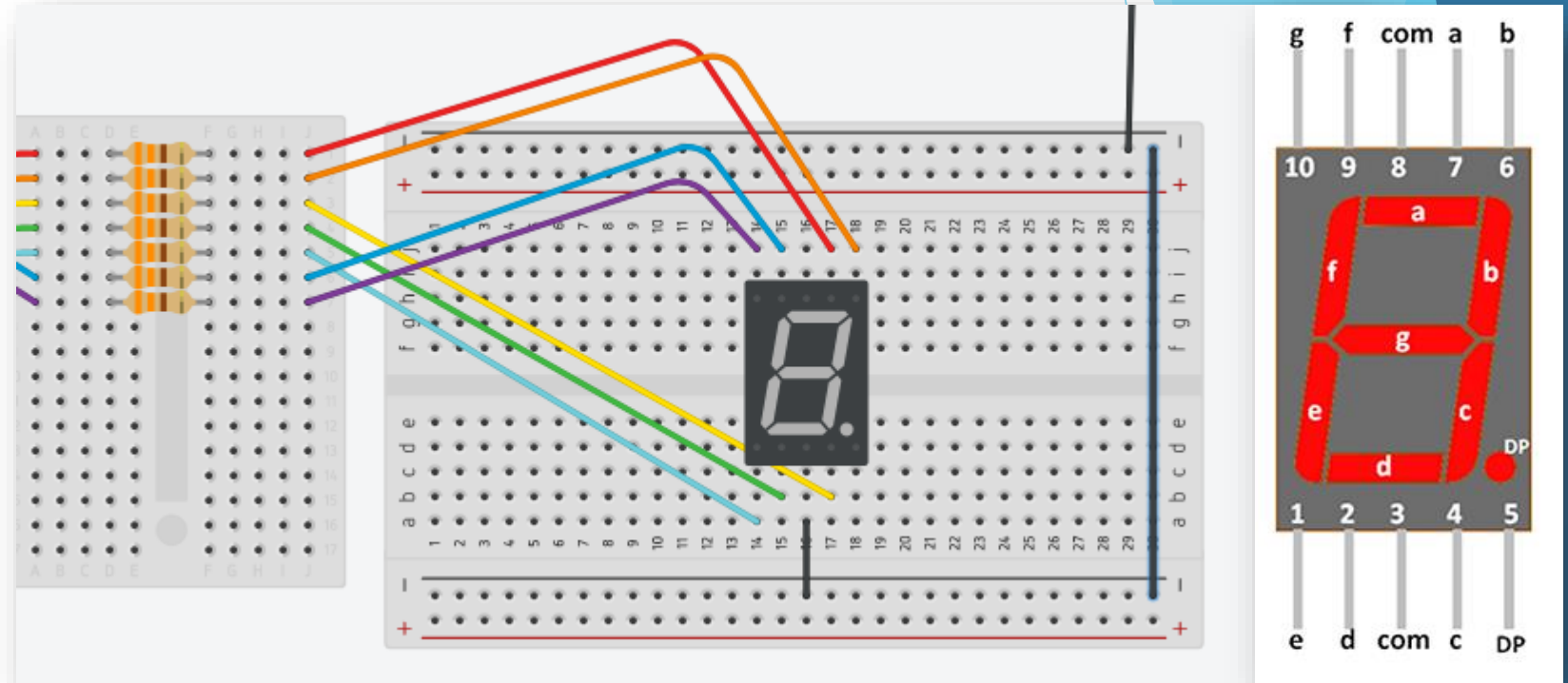
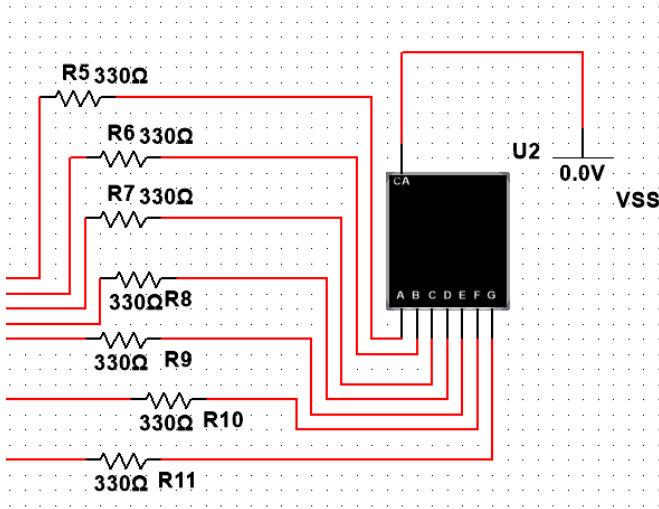
A3 | A2 | A1 | A0



- ▶ We use switches to generate the corresponding bits.
 - Switch 4 for A0 the LSB. A0 at breadboard column 1.
 - Switch 1 for A3 the MSB. A3 at breadboard column 4.



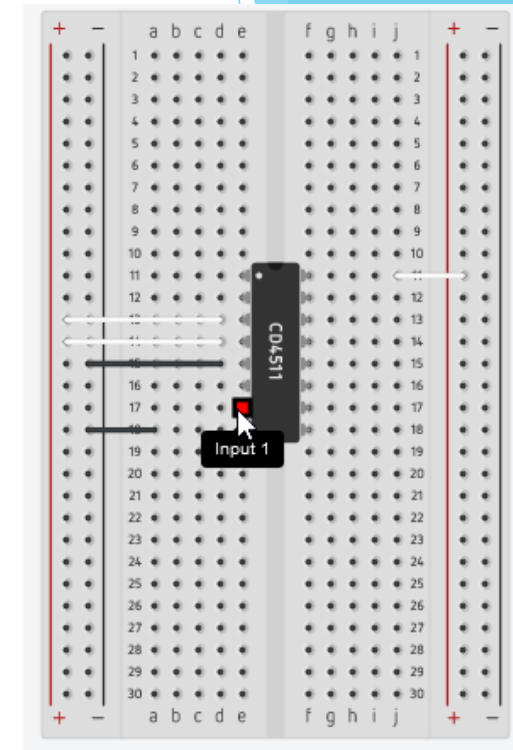
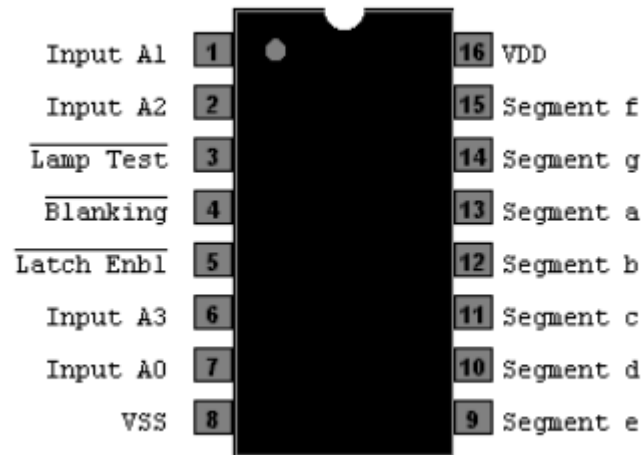
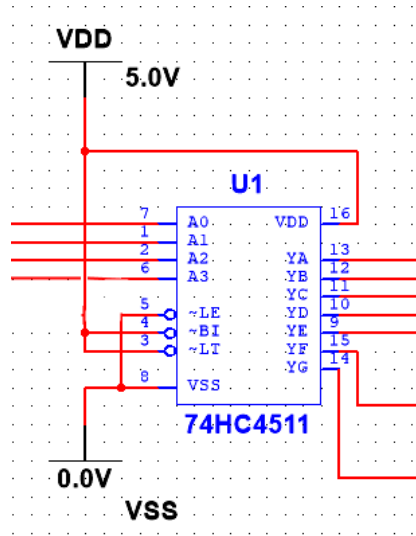
2) Resistors for segments - 3) 7-segment display



- ▶ The 7-segment display has a common cathode connected to VSS (-)
- ▶ In Tinkercad you can click on the component to change its mode.
- ▶ We use rainbow colors for the 7 wires of the segments: red is **a**, orange **b**, yellow **c**, green **d**, turquoise **e**, blue **f**, purple **g**



4) Decoder 4511



- ▶ Connect the VDD and VSS (GND) for the IC
- ▶ The **LT** (Lamp Test) is for turning on all segments when connected to (-). We don't want this feature so we connect it to (+)
- ▶ The **BI** (Blanking Input) is for turning off all segments when connected to (-). We don't want this feature so we connect it to (+)
- ▶ The **LE** (Latch Enable) is connected to (-) so it will immediately update the IC's internal registers.

