1204 – Digital Systems Design Lab

(Spring 2020)

Tutorial 4 – BCD to 7-segment

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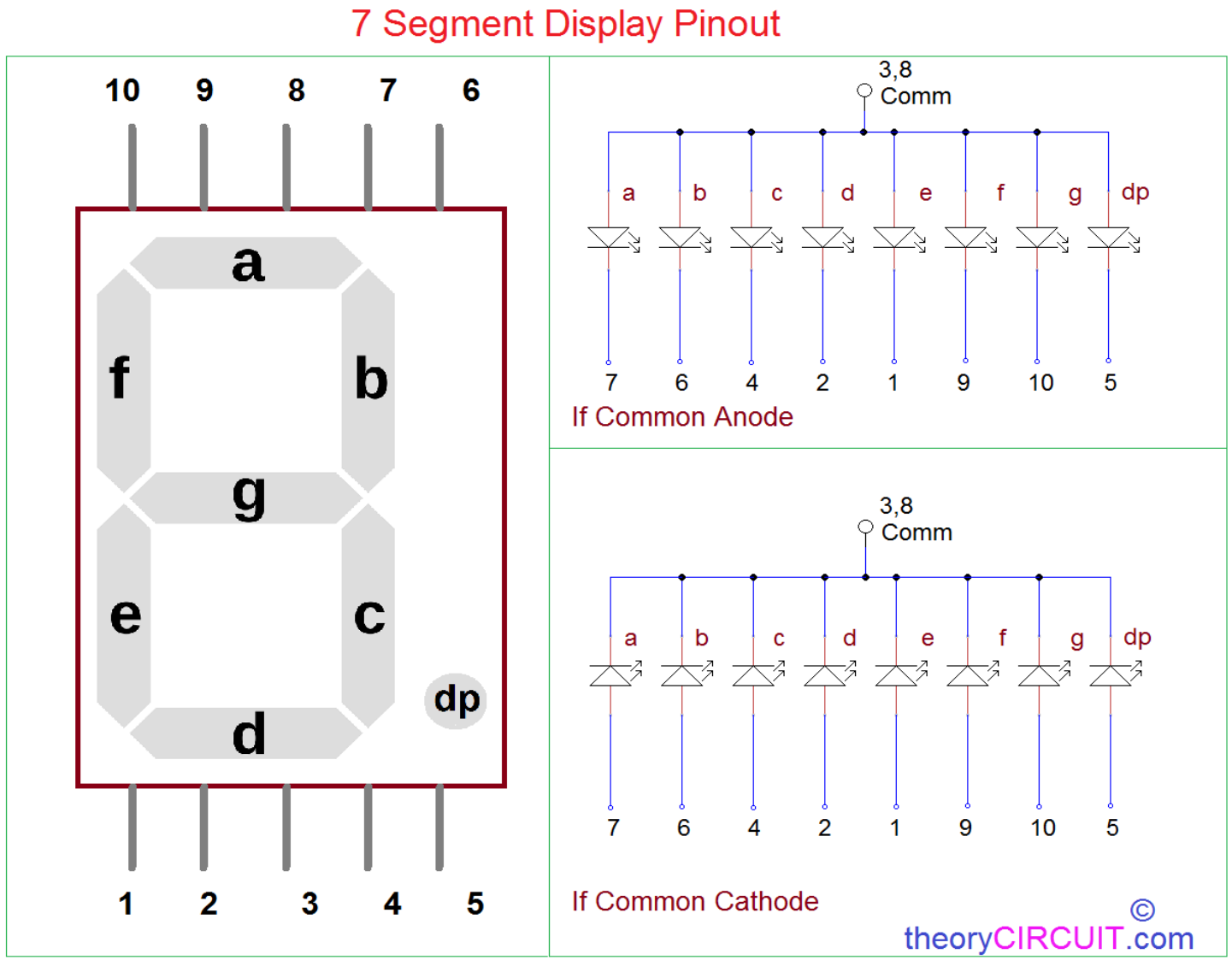
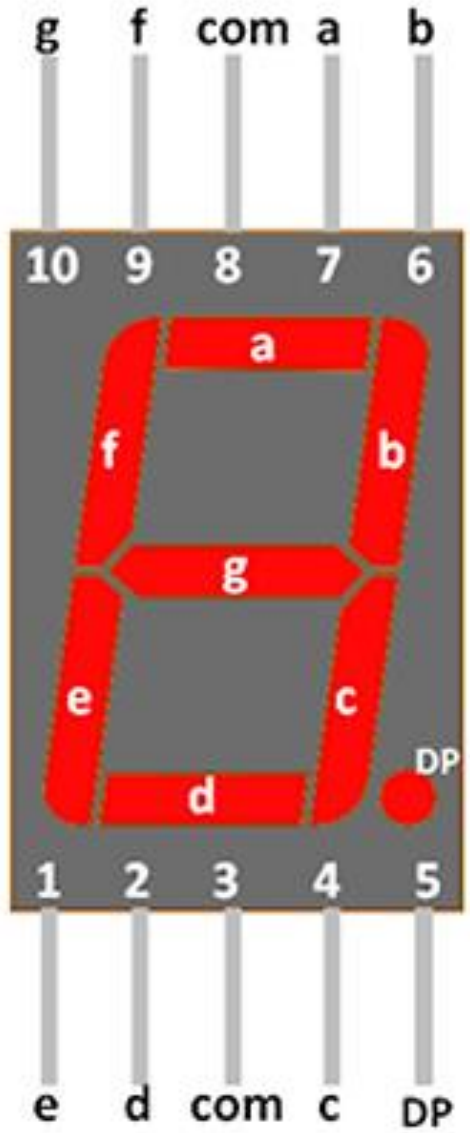
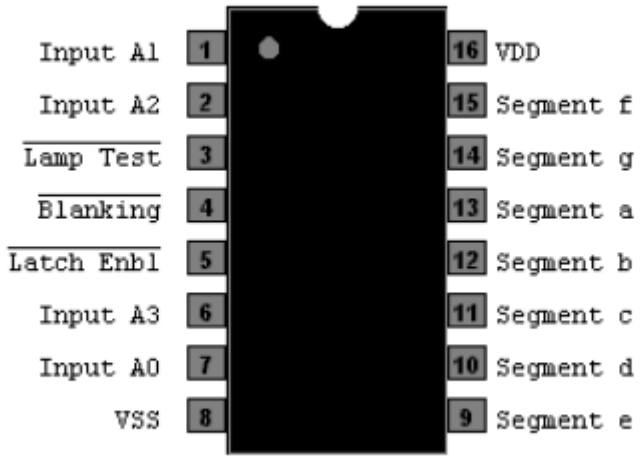


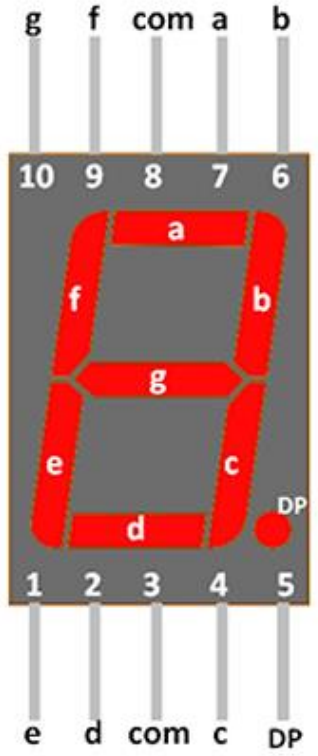


- The display consists of 7 LED segments, that have either a common anode connected to (+) or a common cathode connected to (-).

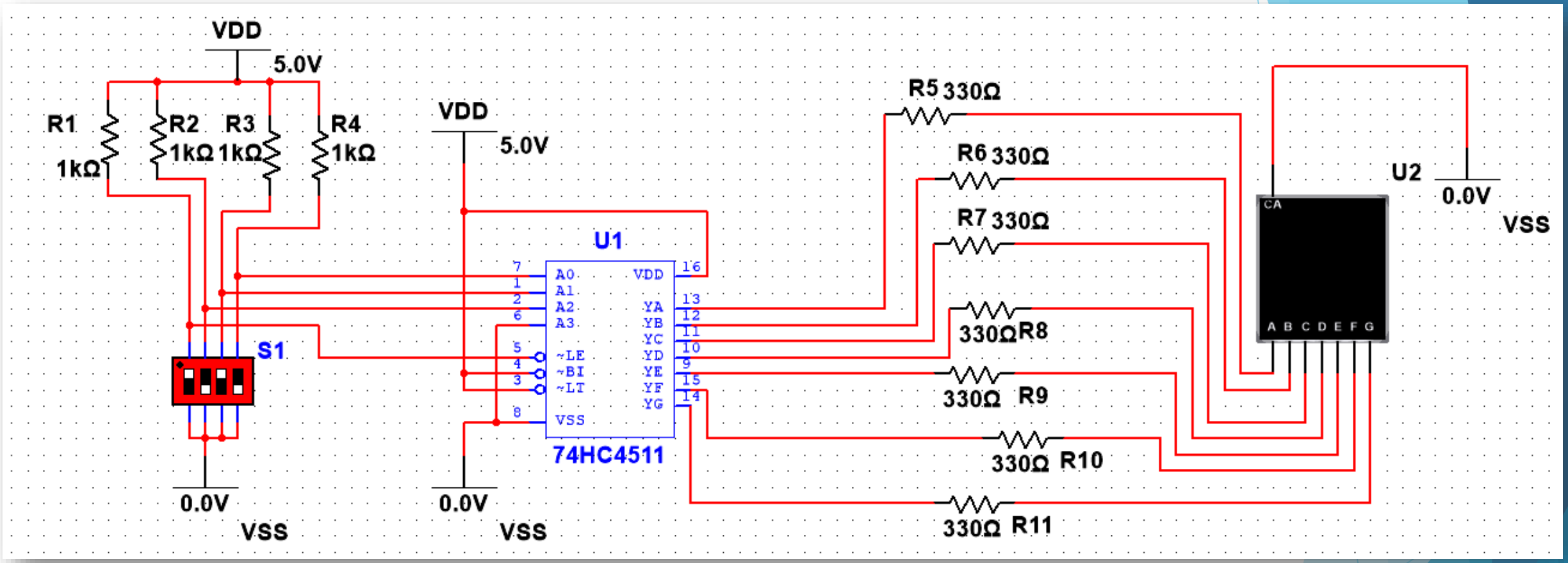
Decimal digit	BCD			
	8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

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.

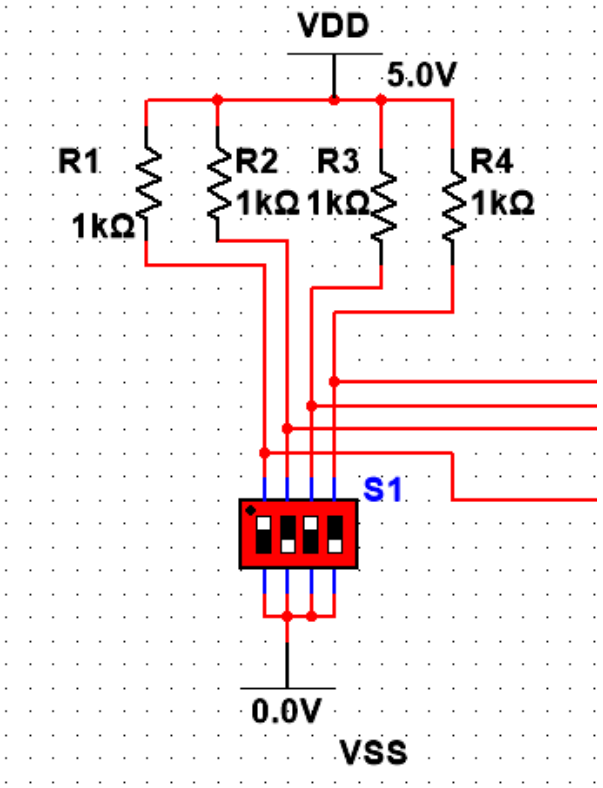


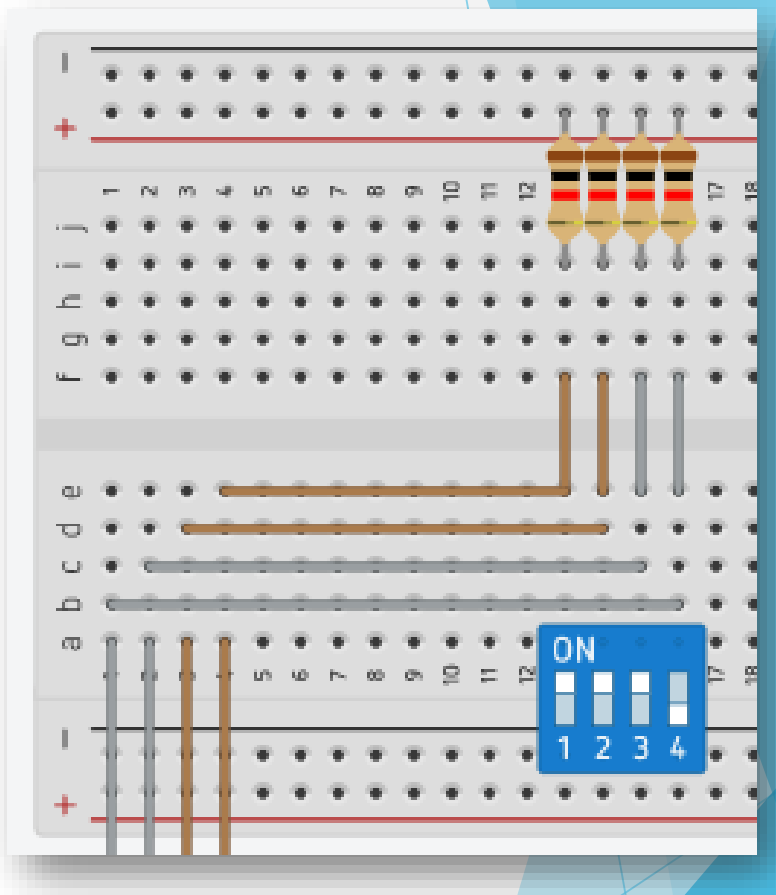
- To implement this schematic you should focus to its 4 parts.
  - switches, resistors for segments, 7-segment display, decoder IC.

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

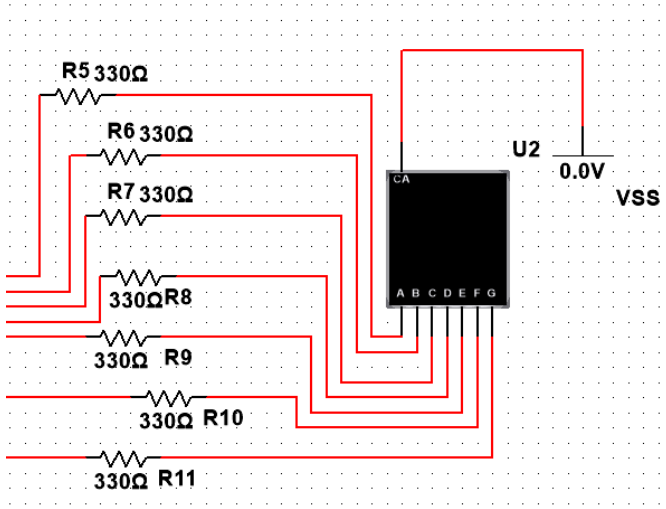
A3 | A2 | A1 | A0

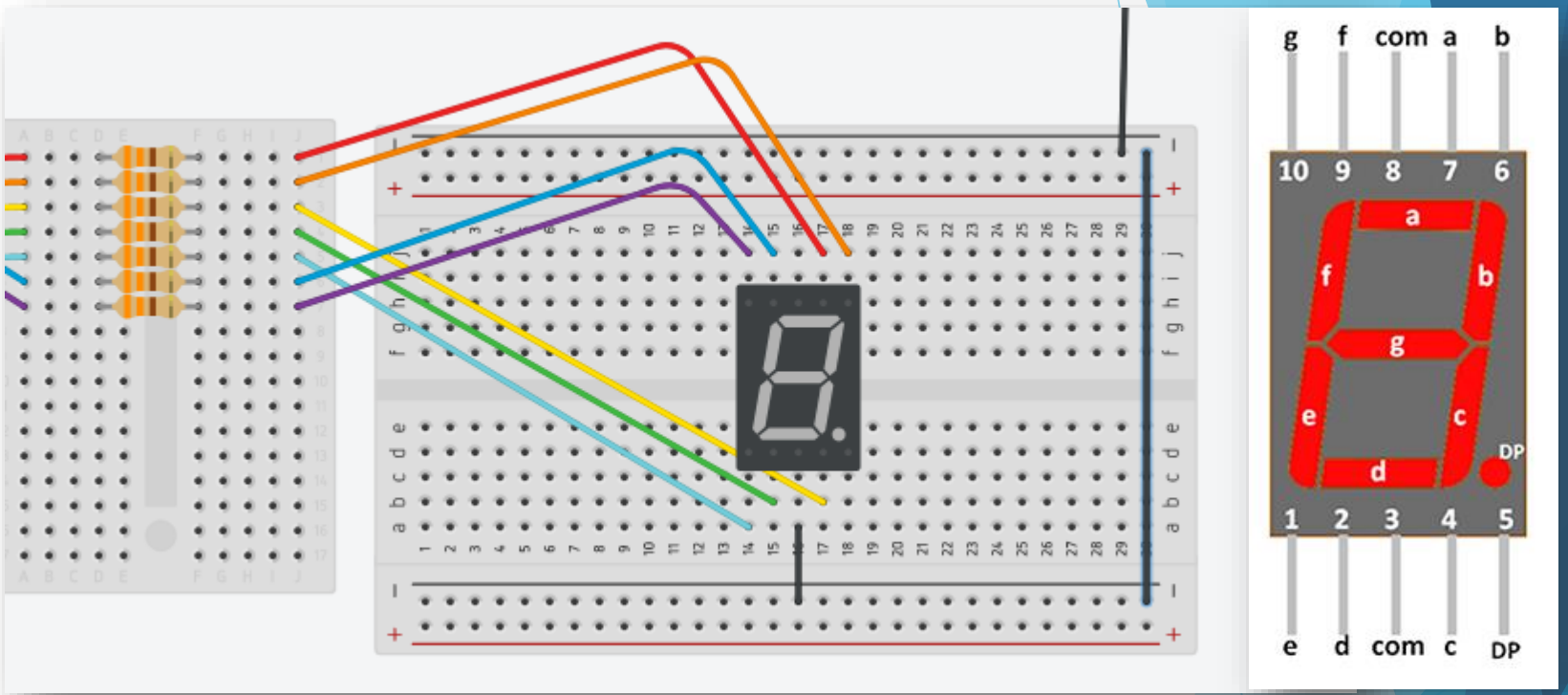




- We use switches to generate the corresponding bits.
  - Switch 4 for A0 the LSB. A0 at breadboard column 1.
  - Switch 1 for A3 the MSN. A3 at breadboard column 4.

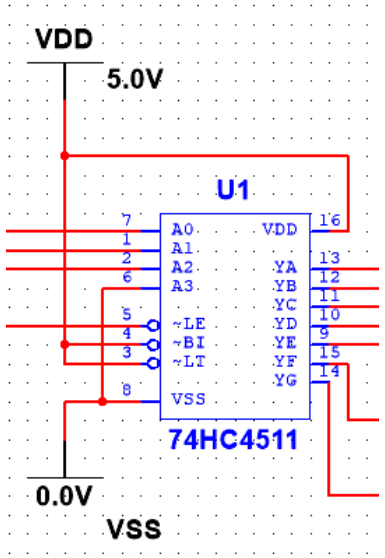
2) Resistors for segments – 3) 7-segment display

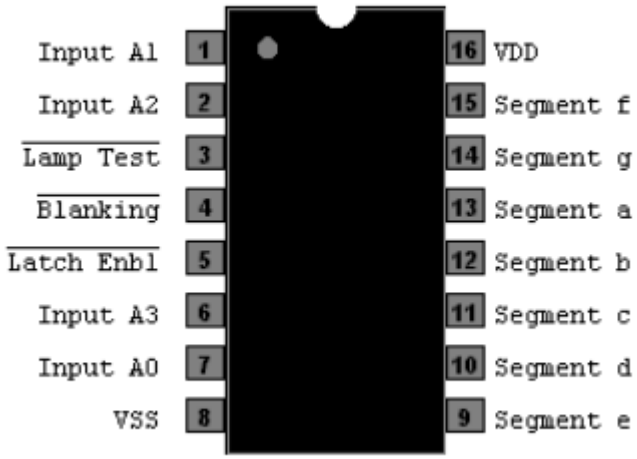


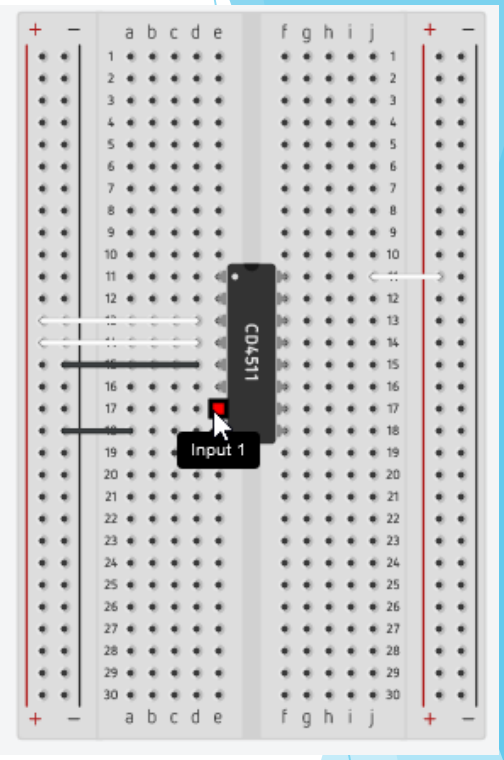


- The 7-segment display has a common cathode connected to VSS (-)
- In Tinkercad you can click on the component to change its mode.
- We use rainbow colors for the 7 wires of the segments: red is a, orange b, yellow c, green d, turquoise e, blue f, purple g

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 features 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.

http://www.learningaboutelectronics.com/Articles/4511-BCD-to-7-segment-display-decoder-circuit.php