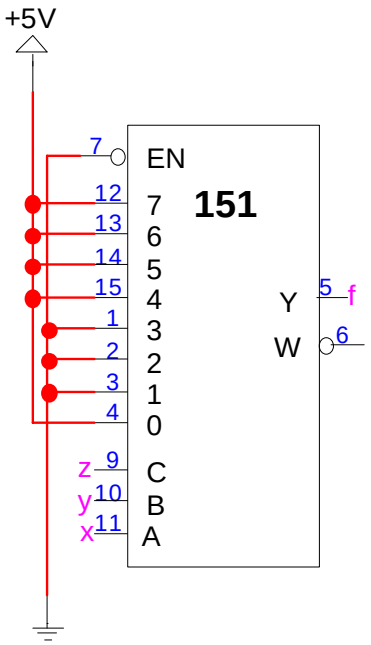
ECE 130 HW#10, Due Tuesday, April 12

1. Implement the canonical expression f(x,y,z) = Σ(1,3,5,6,7) using only ONE 74LS151 multiplexer and as many 2-input NOR gates as you like. Build your circuit using simulation software and verify that it works correctly.



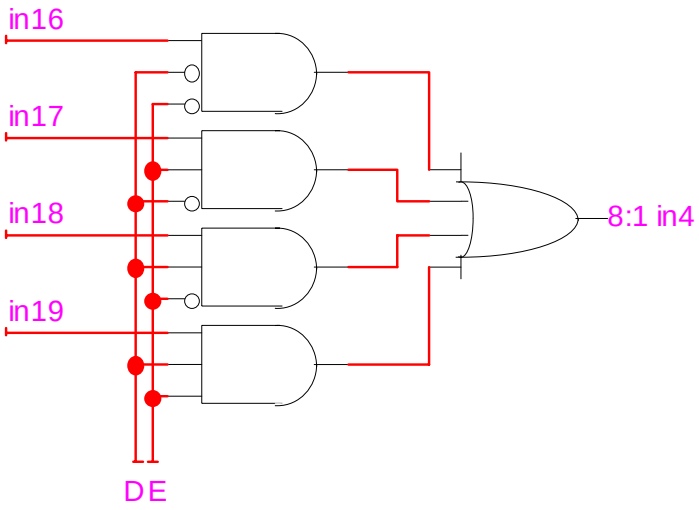
2. Implement a 32:1 multiplexer with active-low enable using only ONE 74LS151 multiplexer and any glue logic (AND, OR, NOT, etc.) that you desire. Build your circuit using simulation software. NOTE: you should not try to test this circuit with all 2^{32} inputs!!!

There are 32 different inputs. Since the mux is 8:1, the inputs must be grouped into sets of four that are then picked in conjunction with the 3 select lines. Let the 32:1 mux select lines be {**a**, **b**, **c**, **d**, **e**}, where **a** is the MSB. If the three MSBs are used as the 8:1 mux select lines, this will partition the truth table into sets of four that utilize the two LSBs, **d** and **e**.

Muxing logic with **d** and **e** must be combined with the inputs to construct the input value to the 8:1 mux. For example, if {**a, b, c**} is 100 (representing the input group 10000 – 10011, or 16 – 19), the input 4 on the 8:1 mux should be:

d	e	8:1 in4
0	0	32:1 in16
0	1	32:1 in17
1	0	32:1 in18
1	1	32:1 in19

This can be accomplished with the following sub-circuit:



Making one sub-circuit for each of the eight inputs leads to the final circuit: