EECE 256 Assignment 4

1. Design a binary multiplier that multiplies two 4-bit numbers. Use AND gates and binary adders.

2. Construct a 4-to-16-line decoder with five 2-to-4 line decoders with enable.

3. A combinational circuit is defined by the following three Boolean functions:

$$F_1 = x'y'z' + xz$$
$$F_2 = xy'z' + x'y$$
$$F_3 = x'y'z + xy$$

Design the circuit with a decoder and external gates.

4. Construct a 16 x 1 multiplexer with two 8 x 1 and one 2 x 1 multiplexers. Use block diagram.

5. Implement the following Boolean function with a multiplexer:
$$F(A, B, C, D) = (0, 1, 3, 4, 8, 9, 15)$$

6. (Optional) An 8 x 1 multiplexer has inputs A, B, and C connected to the selection inputs $S_2, S_1,$ and S_0, respectively. The data inputs I_0 through I_7, are as follows: $I_1 = I_2 = I_7 = 0$; $I_3 = I_5 = 1$; $I_0 = I_4 = D$; and $I_6 = D'$. Determine the Boolean function that the multiplexer implements.

7. 4.29 (also try the HDL version), 4.35,