ECEN 2350 Spring 2017 Homework 4
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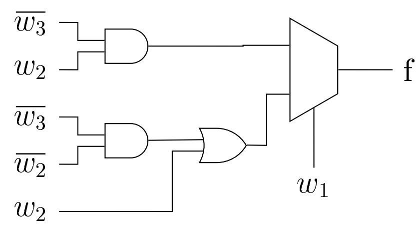
1. *Book Problems: 4.3, 4.21*

(4.3) *Consider* $f = \overline{w_1}\,\overline{w_3} + w_2\overline{w_3} + \overline{w_1}w_2$. *Use the truth table to derive a circuit for* f *that uses a 2-to-1 multiplexer.*

Note that the truth table for the above can be found as:

w_1	w_2	w_3	f
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

Which is equvilent to the below circuit, using w_1 as the select in a muliplexer.



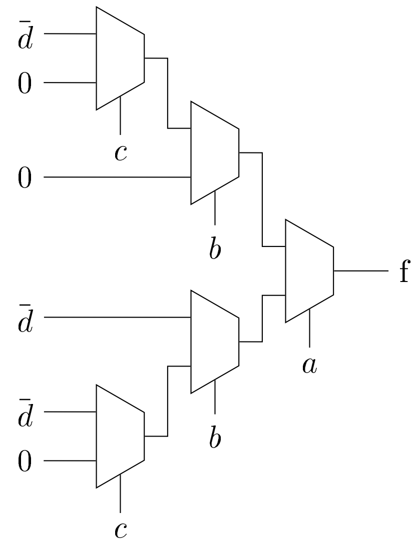
(4.21) *Write Verilog code for an 8-to-3 binary encoder.*

```
module Encode (b, f);
    input [7:0] b;
    output reg [2:0] f;
    always@(*)
    begin
                    case(b)
                    8'b00000001: f = 3'b000;
                    8'b00000010: f = 3'b001;
                    8'b00000100: f = 3'b010;
                    8'b00001000: f = 3'b011;
                    8'b00010000: f = 3'b100;
                    8'b00100000: f = 3'b101;
                    8'b01000000: f = 3'b110;
                    8'b10000000: f = 3'b111;
                    endcase
    end
endmodule
```

2. *Implement the following circuits using only 2-to-1 mulitplexers.*

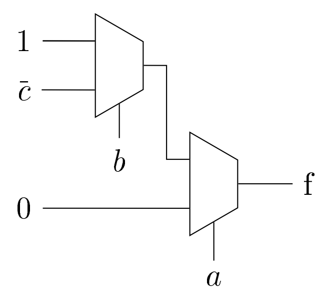
(a) $f = \sum m(2, 5, 6, 14)$
Note that the truth table, and circuit visually derived from it, are as shown below:

a	b	c	d	f
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0



(b) $f = \prod M(3, 4, 5, 6, 7)$
Note that the truth table, and circuit derived from it, are as shown below:

a	b	c	f
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0



3. *Convert the following decimal numbers to 32-bit floating point format.*

   (a) *33554430*
   Hey ho

   (b) *33554431*
   Let's go

4. *Convert the following decimal numbers to fixed point unsigned binary with at least 8-bits of binary precision*

   (a) *12.45897*
   What now

   (b) *0.333333*
   To much placeholding

5. *For 32-bit Precision Floating point numbers,* `E=0x00` *and* `E=0xFF` *are used for special numbers (like* 0 *and* ∞*). What are the decimal values of the floating point numbers (32-bit) of smallest (non-zero) and largest (non-infinity) magnitude*