Homework 6: EE 252 Digital Electronics

1 Show how the function $f(w_1, w_2, w_3) = \sum m(1, 2, 3, 5, 6)$ can be implemented using a 3-to-8 binary decoder and an OR gate.

2. Consider the function

$$f = \overline{w}_1\overline{w}_3 + w_2\overline{w}_3 + \overline{w}_1 w_2.$$

Use the truth table to derive a circuit for *f* that uses a 2-to-1 multiplexer.

3. Consider the multiplexer-based circuit illustrated in Figure P4.1. Show how the function

$f = w_2\overline{w}_3 + w_1 w_3 + \overline{w}_2 w_3$ can be implemented using only one instance of this circuit.

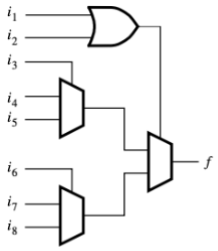

Figure P4.1 A multiplexer-based circuit.

4. Figure P4.3 shows a modified version of the code for a 2-to-4 decoder in Figure 4.37. This code is almost correct but contains one error. What is the error?

```
module dec2to4 (W, En, Y);
   input [1:0] W;
   input En;
   output reg [0:3] Y;
   integer k;

   always @(W, En)
      for (k = 0; k < = 3; k = k+1)
         if (W == k)
            Y[k] = En;

endmodule
```

Figure P4.3 Code for Problem 4.22.