EE 231 – Homework Chapter 4

4.10 Derive a minimum-cost realization of the four-variable function that is equal to 1 if exactly two or exactly three of its variables are equal to 1; otherwise it is equal to 0.

4.12 A circuit with 2 outputs has to implement the following functions

$$f(x1, \dots, x4) = \sum m(0,2,4,6,7,9) + D(10,11)$$
$$g(x1, \dots, x4) = \sum m(2,4,9,10,15) + D(0,13,14)$$

Design the minimum-cost circuit and compare its cost with combined costs of two circuits that implement f and g separately. Assume that the input variables are available in both uncomplemented and complemented forms.

4.16 Implement the logic circuit in Figure 4.25 using NAND gates only.

4.20 Find the simplest realization of the function $f(x1, \dots, x4) = \sum m(0,3,4,7,9,10,13,14)$, assuming that the logic gates have a maximum fan-in of two.

4.35 Write Verilog code to implement the circuit in Fig 4.25b using the gate level primitives.

4.38 Write Verilog code to implement the circuit in Figure 4.27c using the continuous assignment.