ENCS 234 – Digital Systems – First Semester 2015/2016

Homework set 2

Issued Saturday 31-10-2015

Due Monday 9-11-2015 for sections 1, 2, and 5 (Beginning of class)

Due Tuesday 10-11-2015 for sections 3 and 4 (Beginning of class)

Problem 1:

Consider the Boolean function:

$F(A,B,C,D) = \sum(1, 4, 5, 10, 12, 14)$

a) Using the K-map method, find the simplest sum-of-product expression.
b) Implement the expression you found in (a) using NAND gates only.

Problem 2:

Using the Tabulation method, find all the equally-minimal Boolean expressions for the same function in problem 1 above.

Problem 3:

Consider the Boolean function:

$F(A,B,C,D) = \sum(1, 4, 5, 6, 10, 12, 13)$

And the don't-care conditions:

$d(A,B,C,D) = \sum(0, 3, 8, 11, 15)$

Find the simplest Boolean expression that can be obtained utilizing the don't-care conditions.

Problem 4:

Draw a logic diagram implementation for the following Verilog module:

```
module Problem4 (A, B, C, D, E);
        output D, E;
        input A, B, C;
        wire w1, w2;
        and G1(w1, A, B);
        not G2(E, C);
        assign D = (A && B) || (!C) || w2;
        assign w2 = A && w1 && !B;
endmodule
```