

University of Illinois at Urbana-Champaign
Department of Electrical and Computer Engineering

ECE 362/CS 362/MATH 391 : LOGIC DESIGN

Spring 2002

Problem Set 7

Special Functions, Decompositions, Binary Decision Diagrams

Issued: Thursday, March 7th.

Due: Thursday, March 14th.

Reading from McCluskey: Chapter 5, Sections 5.1–5.4 and 5.6.

Problem 7.1

Problem 5.1 from McCluskey (assume that the functions are either: (i) totally symmetric, or (ii) mixed symmetric for the same set of variables).

Problem 7.2

Problems 5.2 and 5.3 from McCluskey.

Problem 7.3

Problem 5.6 (part (c) only) from McCluskey.

Problem 7.4

Problem 5.7 (parts (a) and (d) only) from McCluskey.

Problem 7.5

Problem 5.12 (parts (a) and (d) only) from McCluskey.

Problem 7.6

Problem 5.17 (part (a) only) from McCluskey. Give only decompositions of the form $f(g(a, b), c, d)$, where a, b, c, d is some permutation of w, x, y, z .

Problem 7.7

Obtain reduced ordered binary decision diagrams (BDDs), for the order x_1, x_2, x_3, \dots , for the following functions.

- (a) The three-variable majority function $f(x_1, x_2, x_3)$.
- (b) The function $f(x_1, x_2, x_3, x_4)$ which outputs 1 if and only if the two-bit integer x_1x_2 is larger than the two-bit integer x_3x_4 .