CMPUT 329: COMPUTER ORGANIZATION AND ARCHITECTURE II
Homework # 1
Issue Date: 09 September, 2002
Due Date: 16 September, 2002

CMPUT 329 Honor Code

By turning in the homework solution for grading, I certify that I have worked all the solutions on my own, that I have not copied or transcribed solutions from a classmate, someone outside the class, or from any other source. I also certify that I have not facilitated or allowed any of my classmates to copy my own solutions. I am aware that the violation of this honor code constitutes a breach of the trust granted me by the teaching staff, compromises my reputation, and subjects me to the penalties prescribed in Section 26.1 of the University of Alberta 2002/2003 Calendar.

Edmonton, September, 2002.

StudentID:	Name:

Problem 1
Using NERD, DESIGNER, FAILURE, and STUDIED, write a boolean expression that is 1 for successful designers who never studied and for nerds who studied all the time

Problem 2
Use the theorems of switching algebra to simplify each of the following logic functions:

a. $F = W \cdot X \cdot Y \cdot Z \cdot (W \cdot X \cdot Y \cdot Z' + W \cdot X' \cdot Y \cdot Z + W' \cdot X \cdot Y \cdot Z + W \cdot X \cdot Y' \cdot Z)$

b. $F = A \cdot B + A \cdot B \cdot C' \cdot D + A \cdot B \cdot D \cdot E' + A \cdot B \cdot C' \cdot E + C' \cdot D \cdot E$

c. $F = M \cdot N \cdot O + Q' \cdot P' \cdot N' + P \cdot R \cdot M + Q' \cdot O \cdot M \cdot P' + M \cdot R$

Problem 3

Write the canonical sum and product for each of the following logic functions:

a. $F = \sum_{X,Y}(1, 2)$

b. $F = \sum_{A,B,C}(2, 4, 6, 7)$

c. $F = X + Y' \cdot Z'$

d. $F = \prod_{A,B}(0, 1, 2)$

e. $F = \prod_{W,X,Y}(0, 1, 3, 4, 5)$

f. $F = V' + (W' \cdot X)'$

Problem 4

Use a Karnaugh Map to find the minimal sum-of-products expression for each of the following logic functions:

a. $F = W \cdot X \cdot Z' + W \cdot X' \cdot Y \cdot Z + X \cdot Z$

b. $F = (X' + Y') \cdot (W' + X' + Y) \cdot (W' + X + Z)$

c. $F = A \cdot B \cdot C' \cdot D' + A' \cdot B \cdot C' + A \cdot B \cdot D + A' \cdot C \cdot D + B \cdot C \cdot D'$

d. $F = \sum_{V,W,X,Y,Z}(0, 1, 2, 3, 4, 5, 10, 11, 14, 20, 21, 24, 25, 26, 27, 28, 29, 30)$

e. $F = \sum_{V,W,X,Y,Z}(0, 2, 4, 6, 7, 8, 10, 11, 12, 13, 14, 16, 18, 19, 29, 30)$

f. $F = \prod_{V,W,X,Y,Z}(4, 5, 10, 12, 13, 16, 17, 21, 25, 26, 27, 29)$

g. $F = \sum_{V,W,X,Y,Z}(4, 6, 7, 9, 11, 12, 13, 14, 15, 20, 22, 25, 27, 28, 30) + d(1, 5, 29, 31)$

h. $F = \prod_{a,b,c,d}(0, 2, 4, 6,) \cdot d(3, 8, 14)$