

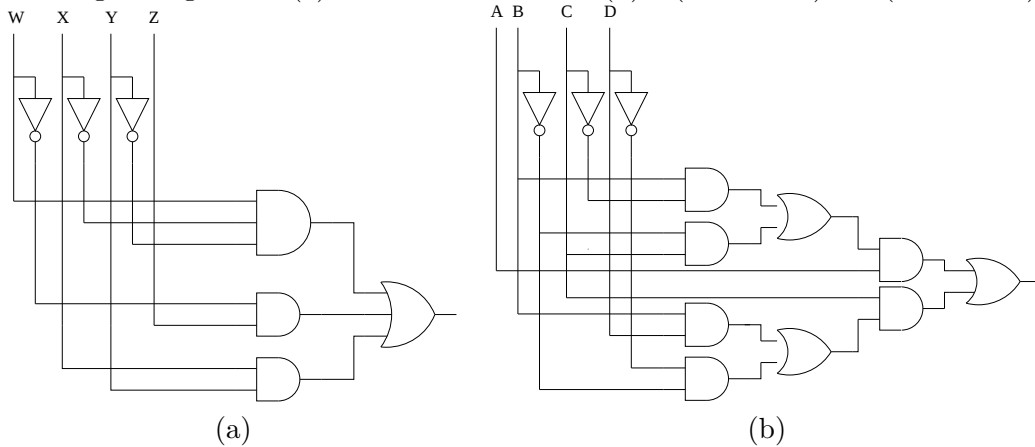
ENG2410 Assignment #2 Solutions

School of Engineering, University of Guelph, Fall 2025

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1. Draw logic Diagram of (a) $W\bar{X}\bar{Y} + \bar{W}Z + XY$ (b) $A(B\bar{C} + \bar{B}C) + C(BD + \bar{B}\bar{D})$



2. Truth Table and expressions for Y and Z:

- The Truth Table:

A	B	C	D	Y	Z
0	0	0	0	0	0
0	0	0	1	0	0
0	0	1	0	1	0
0	0	1	1	0	1
0	1	0	0	1	0
0	1	0	1	0	0
0	1	1	0	1	1
0	1	1	1	0	0
1	0	0	0	1	0
1	0	0	1	0	1
1	0	1	0	0	0
1	0	1	1	0	0
1	1	0	0	0	0
1	1	0	1	0	0
1	1	1	0	0	0
1	1	1	1	0	0

- $Y = A'B'CD' + A'BC'D' + A'BCD' + AB'C'D'$
- $Z = A'B'CD + A'BCD' + AB'C'D$

3. Design of a 3-input Function:

X	Y	Z	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

$$F = \overline{X}YZ + X\overline{Y}Z$$

$$F = \sum m(3, 5)$$

4. Design of a 4-input circuit that counts the number of 1's:

A	B	C	D	X	Y	Z
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	1	0
0	1	0	0	0	0	1
0	1	0	1	0	1	0
0	1	1	0	0	1	0
0	1	1	1	0	1	1
1	0	0	0	0	0	1
1	0	0	1	0	1	0
1	0	1	0	0	1	0
1	0	1	1	0	1	1
1	1	0	0	0	1	0
1	1	0	1	0	1	1
1	1	1	0	0	1	1
1	1	1	1	1	0	0

$$X = A.B.C.D$$

$$X = \sum m(15)$$

$$Y = \overline{A}.\overline{B}.C.D + \overline{A}.B.\overline{C}.D + \overline{A}.B.C.\overline{D} + \overline{A}.B.C.D + A.\overline{B}.\overline{C}.D + A.\overline{B}.C.\overline{D} + A.\overline{B}.C.D + A.B.\overline{C}.\overline{D} + A.B.\overline{C}.D + A.B.C.\overline{D}$$

$$Y = \sum m(3, 5, 6, 7, 9, 10, 11, 12, 13, 14)$$

$$Z = \overline{A}.\overline{B}.\overline{C}.D + \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.B.\overline{C}.\overline{D} + \overline{A}.B.C.D + A.\overline{B}.\overline{C}.\overline{D} + A.\overline{B}.C.D + A.B.\overline{C}.D + A.B.C.\overline{D}$$

$$Z = \sum m(1, 2, 4, 7, 8, 11, 13, 14)$$