

## CS2208b Assignment 2

Issued on: Thursday, January 28, 2016

**Due by: 11:55 pm on Thursday, February 4, 2016**

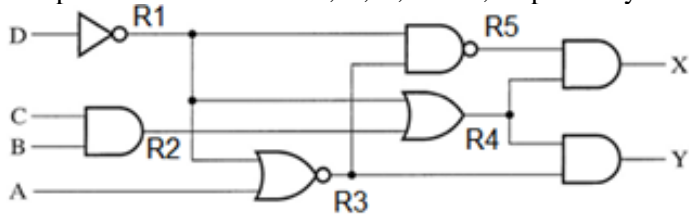
- For this assignment, **only electronic submission** at owl.uwo.ca is required.
- ***Start each question in a NEW PAGE***
- ***Write the question number in a separate line followed by an empty line***
- After finishing the assignment, you have to do the following:
  - ❖ Type your report and convert it to the **PDF** format (*no handwriting*),
  - ❖ Prepare a soft-copy submission
  - ❖ Upload the soft-copy submission.

**Failure to follow the above format may cost you 10% of the total assignment mark.**

- Late assignments are strongly discouraged
  - 10% will be deducted from a late assignment (up to 24 hours after the due date/time)
  - After 24 hours from the due date/time, late assignments will receive a zero grade.

**QUESTION 1 (25 marks)**

Analyze the following combinational circuit by determining the values of all intermediate and final outputs for all possible inputs (16 different cases in total). Express and simplify (to the simplest sum of products expression) all intermediate and final outputs using Boolean expressions in term of A, B, C, D,  $A^c$ ,  $B^c$ ,  $C^c$ , and  $D^c$ , where  $A^c$ ,  $B^c$ ,  $C^c$ , and  $D^c$  are the complemented values of A, B, C, and D, respectively.



Your answer should be in the form of a table and an expression for each output. Show all of the simplification steps and state which algebraic law you used in each step (see slide 89 and 90 in Chapter 2).

R1 =

R2 =

R3 =

R4 =

R5 =

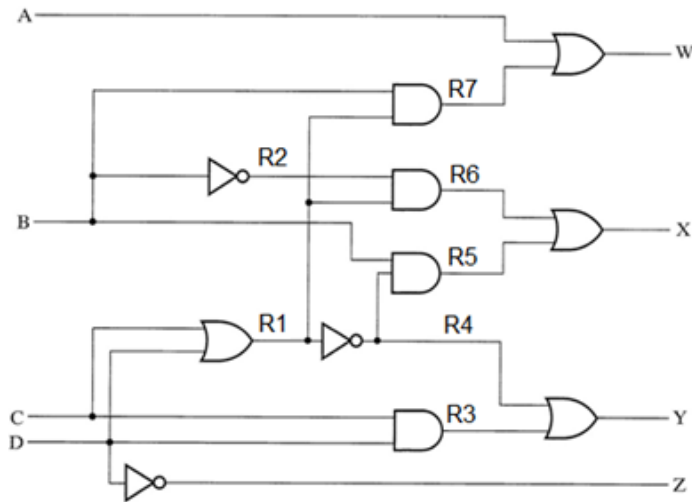
X =

Y =

A	B	C	D	R1	R2	R3	R4	R5	X	Y
0	0	0	0							
0	0	0	1							
0	0	1	0							
0	0	1	1							
0	1	0	0							
0	1	0	1							
0	1	1	0							
0	1	1	1							
1	0	0	0							
1	0	0	1							
1	0	1	0							
1	0	1	1							
1	1	0	0							
1	1	0	1							
1	1	1	0							
1	1	1	1							

## QUESTION 2 (39 marks)

Analyze the following combinational circuit by determining the values of all intermediate and final outputs for all possible inputs (16 different cases in total). Express and simplify (to the simplest sum of products expression) all intermediate and final outputs using Boolean expressions in term of A, B, C, D,  $A^c$ ,  $B^c$ ,  $C^c$ , and  $D^c$ , where  $A^c$ ,  $B^c$ ,  $C^c$ , and  $D^c$  are the complemented values of A, B, C, and D, respectively.



Your answer should be in the form of a table and an expression for each output. Show all of the simplification steps and state which algebraic law you used in each step (see slide 89 and 90 in Chapter 2).

R1 =

R2 =

R3 =

R4 =

R5 =

R6 =

R7 =

W =

X =

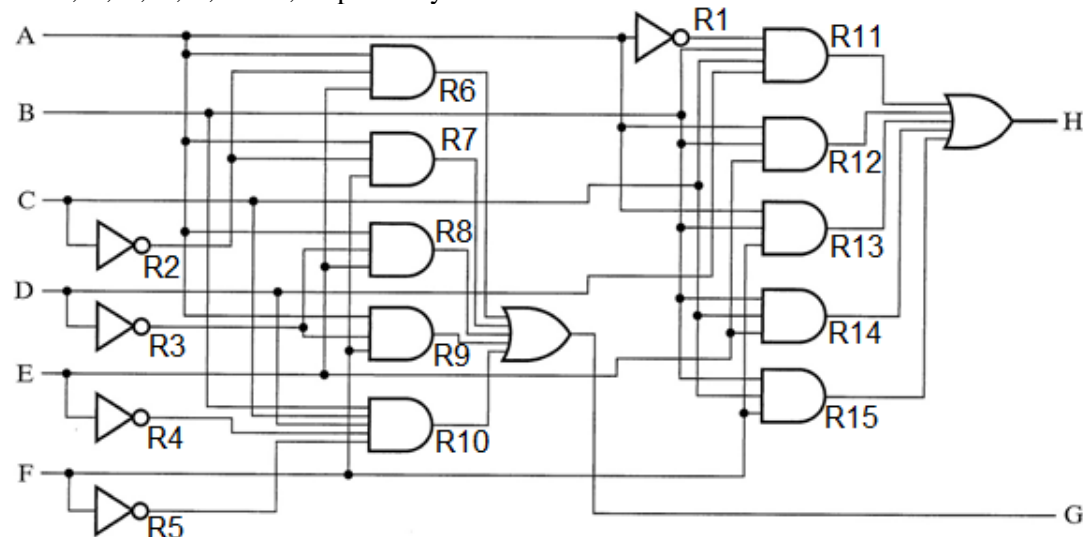
Y =

Z =

A	B	C	D	R1	R2	R3	R4	R5	R6	R7	W	X	Y	Z
0	0	0	0											
0	0	0	1											
0	0	1	0											
0	0	1	1											
0	1	0	0											
0	1	0	1											
0	1	1	0											
0	1	1	1											
1	0	0	0											
1	0	0	1											
1	0	1	0											
1	0	1	1											
1	1	0	0											
1	1	0	1											
1	1	1	0											
1	1	1	1											

### QUESTION 3 (36 marks)

Express and simplify (to the simplest sum of products expression) all intermediate and final outputs using Boolean expressions in term of A, B, C, D, E, F,  $A^c$ ,  $B^c$ ,  $C^c$ ,  $D^c$ ,  $E^c$ , and  $F^c$ , where  $A^c$ ,  $B^c$ ,  $C^c$ ,  $D^c$ ,  $E^c$ , and  $F^c$  are the complemented values of A, B, C, D, E, and F, respectively.



Your answer should be in the form of an expression for each output. Show all of the simplification steps and state which algebraic law you used in each step (see slide 89 and 90 in Chapter 2).

R1 =

R2 =

R3 =

R4 =

R5 =

R6 =

R7 =

R8 =

R9 =

R10 =

R11 =

R12 =

R13 =

R14 =

R15 =

G =

H =