Class:	CECS 201, Section 7
Lab:	6
Title:	Logic Word Problem
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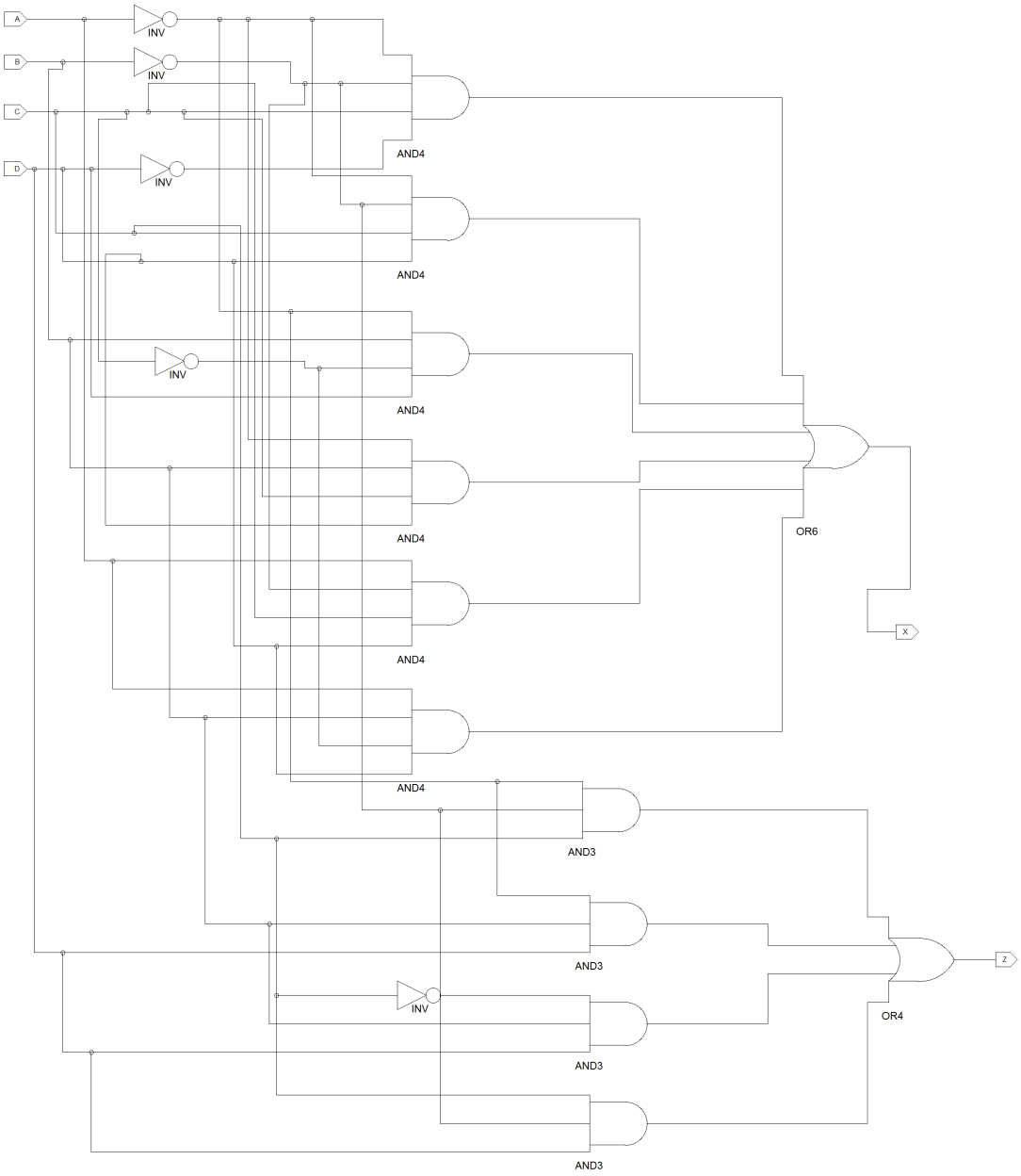
Due Date:	07:00:00 P.M., 18, March 2015
Instructor:	Dan Cregg

b. **Introduction.** This lab involves using logic gates to determine if a four bit unsigned number is a prime.

c. **Project Description.** The four bits of the number are mapped to four inputs A, B, C and D. If the number represented by the bits is true, then the output is 1; otherwise, it is 0. A Karnaugh map is used to simplify the equation and both the simplified and unsimplified equations are simultaneously tested using the Diligent board.

d. **Schematic.**


A
B
C
D
INV
INV
INV
INV
AND4
AND4
AND4
AND4
AND4
AND4
OR6
X
AND3
AND3
AND3
INV
OR4
Z

Truth Table.

A	B	C	D	X
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

Karnaugh Map.

Using Karnaugh map, we have that

	00	**01**	**11**	**10**
00	0	0	1	1
01	0	1	1	0
11	0	1	0	0
10	0	0	1	0

so that $X(A, B, C, D) = \overline{A}\overline{B}C + \overline{A}BD + B\overline{C}D + \overline{B}CD$.