DESIGN SPECIFICATION TO LOGIC EXPRESSION

Your new car has an audio alarm that buzzes whenever **the *door is open* and the *key is in the ignition*** or *when* ***the key is in the ignition* and *the seatbelt is not buckled***.
Using the following variable names and assignment conditions:

Complete the truth table shown below that captures the functionality of this audio alarm.

- D: Door → 0=Door Open / 1=Door Close
- K: Key → 0=Key Not in Ignition / 1=Key in Ignition
- S: Seat → 0=Not Buckled / 1=Buckled
- B: Buzzer → 0=Buzzer Off / 1=Buzzer On

D (Door)	K (Key)	S (Seat Belt)	B (Buzzer)
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

1. Using the truth table you just created, write logic expression for the buzzer (i.e., variable B).
2. Build and test the logic circuits in the NI ELVIS board that you designed. Verify that the circuits are working as expected.
3. Simplify the logic expression and build and test the simplified circuit in NI ELVIS board.

Conclusion

A digital logic circuit with (2) inputs has (4) input combinations. One with (3) inputs has (8) combinations. One with (4) inputs has (16) combinations.

1. How many input combinations would a digital logic circuit have if it has (5) inputs? How about (6) inputs?

2. Mathematically express the relationship between the number of input (N) and the number of input combinations (C).

3. Write the un-simplified logic expression for the truth table shown below.

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

Did you see the short cut? (Hint: Z is always a one.)

Lab performed on (date): _____ Signature: _____

Checked by: _____ Date: _____

Marks Awarded: _____