

Homework #3  
Due Su. 9/19

**Note:** Do not use a calculator or computer to complete the following exercises. You must show all your work and put a box around your final answer to receive credit. Messy or unreadable submissions will receive no credit.

**Total Points:** 75

1. (0 points) How long (in hours) did it take you to complete the homework? This will not affect your grade (unless omitted) but it helps gauge the workload for this and future semesters. If you do not answer this question you will get -5 points.

2. (5 points) Write a Boolean equation for the following statement.

If it **R**ains and you are in **L**as Vegas, you will **D**ance outside.

The inputs are R (TRUE when rains, otherwise FALSE), and L (TRUE when in Vegas, otherwise FALSE). Output is D (TRUE when you dance outside, otherwise FALSE). Note: otherwise FALSE statement is not required and will be omitted from here on.

3. (5 points) Write a Boolean equation for the following statement.

If you are wearing **B**lue pants or if you are wearing **B**lue pants and a **R**ed shirt, you get some **G**um.

The inputs are B (TRUE when wearing blue pants), and R (TRUE when wearing a red shirt). Output is G (TRUE when you get gum).

4. (5 points) Write a Boolean equation for the following statement.

You win if you either press the red and green buttons but not the yellow button, or if you press the blue button but not the red button.

The inputs are r, g, y, b for each color (TRUE when red, green, yellow, or blue button is pressed respectively). Output is w (TRUE when you win).

5. (15 points) Complete Exercise 2.2 (a-c) in the textbook.

6. (15 points) Complete Exercise 2.4 (a-c) in the textbook.

7. (5 points) Minimize expression from Problem 3 and justify the answer (e.g. give Boolean Theorem used). Explain if it cannot be minimized.

8. (15 points) Minimize each of the Boolean equations from Problem 5. Show your work and list which axiom or theorem was used in each step. The final equation should be in minimized sum-of-product (SOP) form.

9. (10 points) **Hands-On Exercise**

This week's hands-on exercise will help you get ready to use the Quartus II Web Edition software, a powerful commercial suite that will enable you to design, simulate, and test digital circuits. To use this software, you can either:

1. Install the software on your own laptop or computer, and/or
2. [**Preferred**] Use the software located on the PCs located in the Electrical and Computer Engineering Laboratories, located in TBE B-311 or TBE B-350.

You will be using the Quartus II software in this and future hands-on exercises. The preferred method is to use software in the EE labs to avoid the large file download (v13.1 or v14.1 [2+GB]). **Unless you are confident in installing software and drivers on your own, it is highly recommended that you use the software in the ECE labs.** If you are using the ECE lab computers, you will need an ACE account (see: <https://ace.unlv.edu/>).

For the hands-on portion of the assignment, either install the Quartus II software (optional) and/or make sure you have an ACE account and confirm that you can log into the computers in TBE B-311 or TBE B-350. Instructions on how to install the software on your own computer are in the comp00 assignment.

After you have completed this hands-on portion, **write a single statement at the bottom of your homework** that says one of the following:

1. I successfully installed Quartus II vXX.X on my own computer. (Fill in your version)
2. I successfully logged into a computer in one of the ECE labs using my ACE account and opened Quartus II vXX.X.
3. I both installed Quartus II vXX.X on my own computer and logged into a computer in one of the ECE labs using my ACE account.