Homework #3
Due Th. 9/21

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.

Homework will only be accepted at the beginning of class and all pages must be stapled together.

Total Points: 95

1. (0 points) How long 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. (20 points) Minimize each of the following Boolean equations. 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.

   (a) (5 points) $Y = \bar{A}B + AB$
   (b) (5 points) $Y = A\bar{B}C + ABC$
   (c) (5 points) $Y = AB\bar{C} + \bar{A}$

    (d) (5 points) $Y = \bar{A}B + A$

10. (10 points) Minimize each of the following Boolean equations. 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. Note: we use apostrophe "´" in this problem to indicate complement.

    (a) (5 points) $Y = ABCD' + A'B'CD + CD'$

    (b) (5 points) $Y = AB'C' + CD' + BC'D'$