Name: _____

Homework #7: Logic and Circuits (12 points)

Due to Gradescope by 11:45 PM on Thursday, September 30th

You need to submit a pdf to Gradescope; failure to assign questions to pages will result in a 10% deduction on your grade

Homework Goal: Practice evaluating Boolean expressions, writing truth tables, and following/creating circuits.

Vocab

1. Practice your vocab from these chapters! (1 point)
   We moved away from using vacuum tubes, and now use _____, devices that can be ON or OFF, and have no mechanical/moving parts.
   Transistors can be combined to create _____, which in turn can be combined to create _____, which transform a set of binary inputs into a set of binary outputs.
   _____ is a word used to describe a boolean expression that is never false.

Truth Tables

2. Provide a truth table for each of the following types of gates: (2 points)
   a. 2-input NAND gate
   b. 2-input NOR gate
   c. 3-input AND gate
   d. 3-input OR gate

3. Create a truth table for the following Boolean expression: (2 points)
   (b NOR c) OR (NOT b) AND (c NAND a)

Boolean Logic

4. Assume that a = 3, b = 5, c = 9, d = 2. What is the result of each of the following Boolean expressions? (2 points)
   a. (a > 3) OR (b == c)

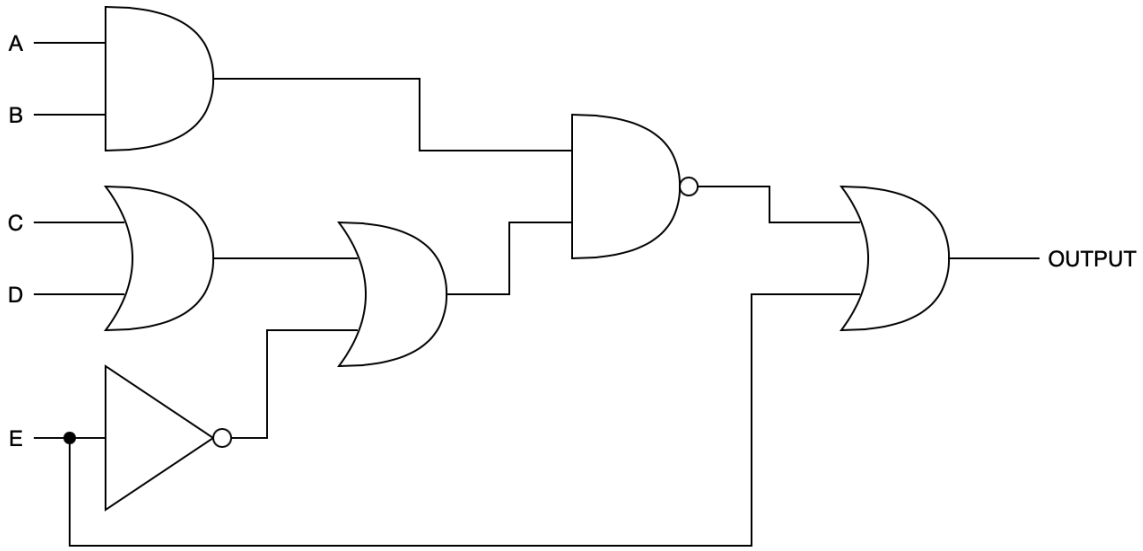
   b. [(a + b) > d] AND (b < c)

   c. NOT [(a == b) OR (b == c)]

   d. (a == 3) AND (d == 2) AND (c == 7)

Circuits

5. Given the following circuit diagram, what is the value output when the inputs are A = 1, B = 0, C = 1, D = 1, E = 0 (don't miss the two circles in the circuit)? (1 point)



6. Draw the circuit diagram for the following Boolean expression (2 points)
(NOT a) AND (c OR (NOT (b AND a))

7. Given the following truth table, write a corresponding Boolean expression and then draw the circuit. (2 points)

a	**b**	**c**	**out**
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1