Homework 2 – Logic Gates and Waveforms

**Student's Name:** _____

**Instructions:**

- You have to show all work in order to receive full credit

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1. A owner of a house wants to design a lamp that works with the following specifications:

- A lamp in a room is operated from two switches, one at the *front* and one at the *back* of the room.
- The lamp is to be ON if both of the switches are ON.
- The lamp is to be OFF if one of the switches is OFF.

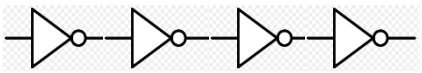
According to the description, the best logic gate to perform the operation is (6 pts): _____

2. The number of output combinations for a 6-input logic gate is (6 pts):

_____

_____

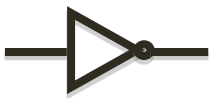
3. If four NOT gates are connected in series and the input to the first gate is a **HIGH** (1), the output of the fourth gate will be (6 pts): _____



4. What is the truth table for an **NAND** gate is (6 pts):

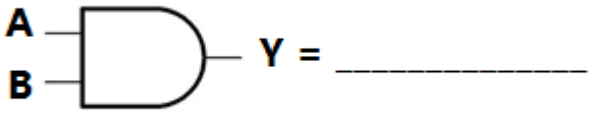
| **Truth Table 2-input NAND gate** | | |
|---|---|---|
| **Inputs** | | **Output** |
| **A** | **B** | **Y** |
| **0** | **0** | |
| **0** | **1** | |
| **1** | **0** | |
| **1** | **1** | |

5. Given the input A, find the output Y of the given gate (6 pts):

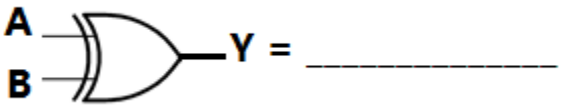
$A = 1001110_2$  Y = _____

6. Given the input A and B, find the output Y of the given gate (6 pts each):

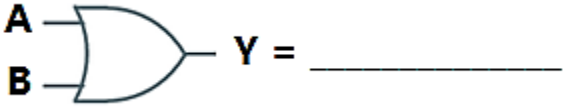
A = 0100 $1011_2$
B = 1110 $1101_2$



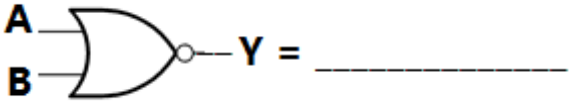

A = 1010 $1100_2$
B = 0110 $0101_2$



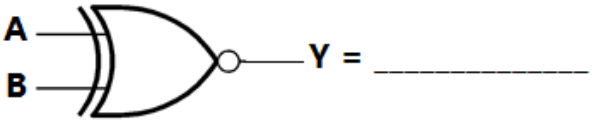

A = 1100 $1100_2$
B = 1010 $0011_2$



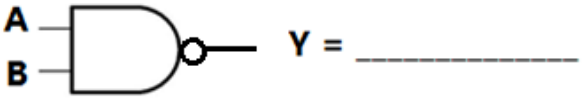

A = 1010 $1100_2$
B = 0110 $0101_2$



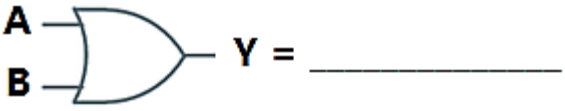

A = 0100 $1011_2$
B = 1110 $1101_2$



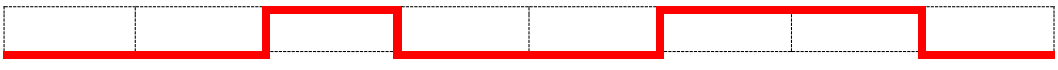

A = 1010 $1100_2$
B = 0110 $1101_2$



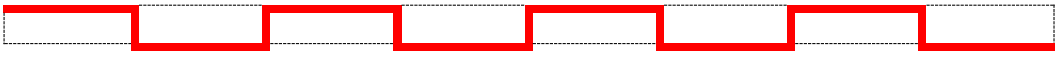

7. Given the input waveform A and B, find the output Y of the given logic gate (11 pts)




**A**

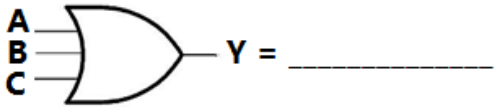


**B**



Y

1. Given the input waveform A, B, and C, find the output Y of the given logic gate (12 pts)



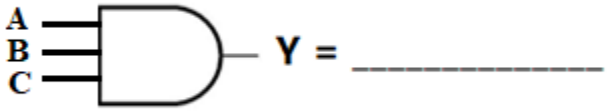

A

B

C

Y

2. Given the input waveform A, B, and C, find the output Y of the given logic gate (11 pts)




A

B

C

Y

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**---------- Homework 2 Ends Here ----------**