Lab #6 Name: _____ Per: _____

Title: USING THE NAND GATE

Materials:
[2] 7400 2-input NAND gate ICs

Procedure:

1. Insert a 7400 IC into the breadboard.
2. Construct a 2-input AND gate using two 2-input NAND gates.
3. Move the input switches to the positions shown in the input section of Table 3-14. Observe and record the output in the AND gate column in Table 3-14. **Get Instructor's Signature.**
4. Rewire the 7400 to create a 2-input OR gate.
5. Move the input switches to the positions shown in the input section of Table 3-14. Observe and record the output in the OR gate column in Table 3-14.
6. Repeat steps 4 and 5 for the NOR, XOR, and XNOR gates (all using the NAND gate equivalent).
7. **You should have your instructor sign after the AND column, after the OR and NOR (come once ready for both), and come a third time for the XOR and XNOR (come once ready for both). You should then be coming up 3 times in all.**

Questions (answer on a separate piece of paper – **"Draw" means you must use a template**)**:**

1. Write the Boolean expression for each of the logic functions you constructed from NAND gates in this experiment.
   a. 2-input AND gate
   b. 2-input OR gate
   c. 2-input NOR gate
   d. 2-input XOR gate
   e. 2-input XNOR gate
2. Draw a logic symbol diagram of the following using only 2-input NAND gates:
   a. inverter
   b. 2-input OR gate
   c. 2-input NOR gate
   d. 2-input XOR gate
   e. $(A+\overline{B})\oplus C$ (draw a box around where it can be simplified)
3. Which XOR gate has *fewer* connections and therefore greater reliability?
   a. 7486 IC
   b. 7400 IC wired to perform the XOR function

Inputs		**Outputs**				
		get signature	get these signed together		get these signed together	
A	B	AND gate	OR gate	NOR gate	XOR gate	XNOR gate
0	0					
0	1					
1	0					
1	1					

Table 3-14