

CS 2614: Computer Organization

Lab 1

Spring 2023

Simple Logic Circuit

Student ID	Name
113511341	Kyunmin Lee,
123597809	ISQAC STEPH



Lab 1: Introduction to Electronic Circuits

Purpose: To gain an understanding of basic electronics safety and concepts used to develop electronic systems with breadboard prototyping techniques

Grade Breakdown:

- 50% - Pre-Lab
- 20% - AND-OR-NOT wiring diagram and circuit construction
- 20% - NAND wiring diagram and circuit construction
- 10% - Active participation in the lab exercise

Safety:

The following guidelines should always be followed when conducting any lab exercise

1. Never connect a chip's V_{cc} (power) pin to ground
2. Never connect a chip's V_{ss} (ground) pin to V_{cc}
3. Avoid touching or bending an IC's pins
4. Always use the IC extractor to remove ICs from the breadboard. This is for your safety and the IC's as well

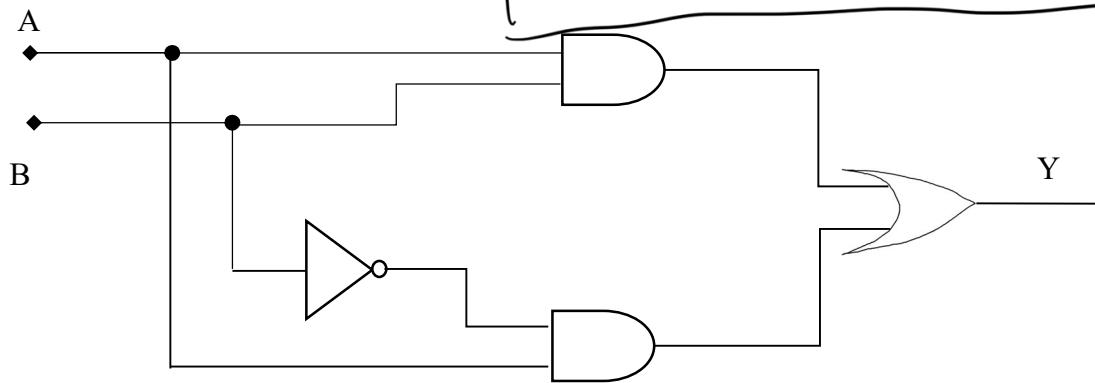
Datasheet Review:

- Always consult the datasheet when creating a wiring diagram
- Make sure to have access to datasheets during the lab session

Pre-Lab Exercise

1. Write the Boolean expression for Y.

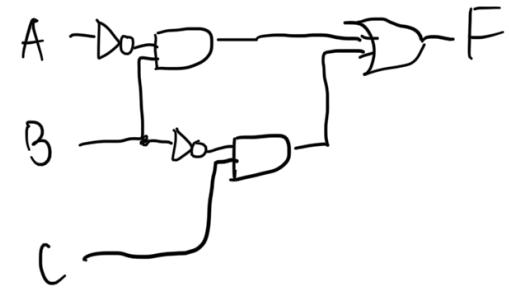
$$AB + AB' = A = Y$$



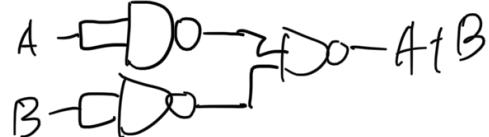
2. For the following Boolean expression, draw the truth table and then draw the circuit diagram.

$$F = (A'B + B'C)$$

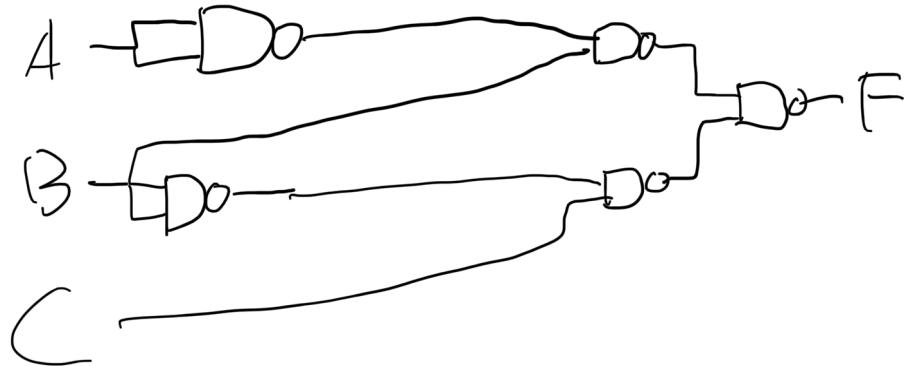
A	B	C	$A'B$	$B'C$	F
0	0	0	0	0	0
0	0	1	0	1	1
0	1	0	1	0	1
0	1	1	1	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	0	0	0
1	1	1	0	0	0



3. Draw the logic diagram for AND, OR, and NOT gates, then convert them into NAND gate equivalent.



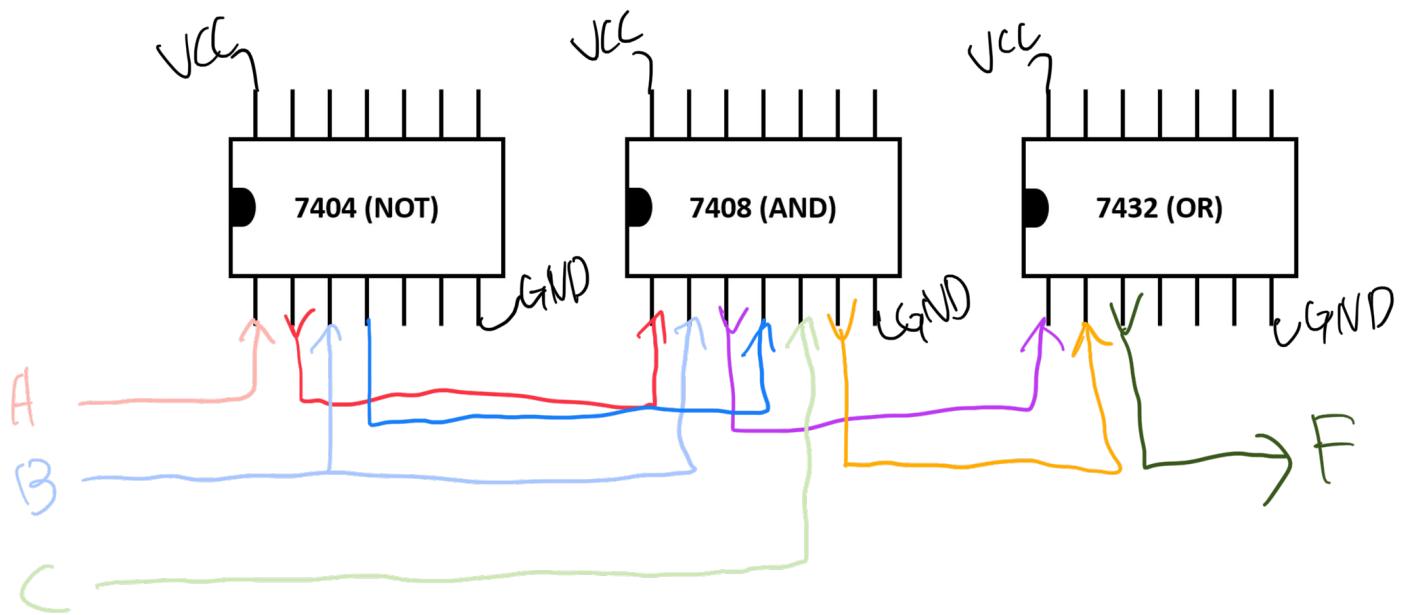
4. Using the gate equivalents in Problem 3, redraw the circuit of Problem 2 using only five NAND gates.



Remember to upload this pre-lab on Canvas

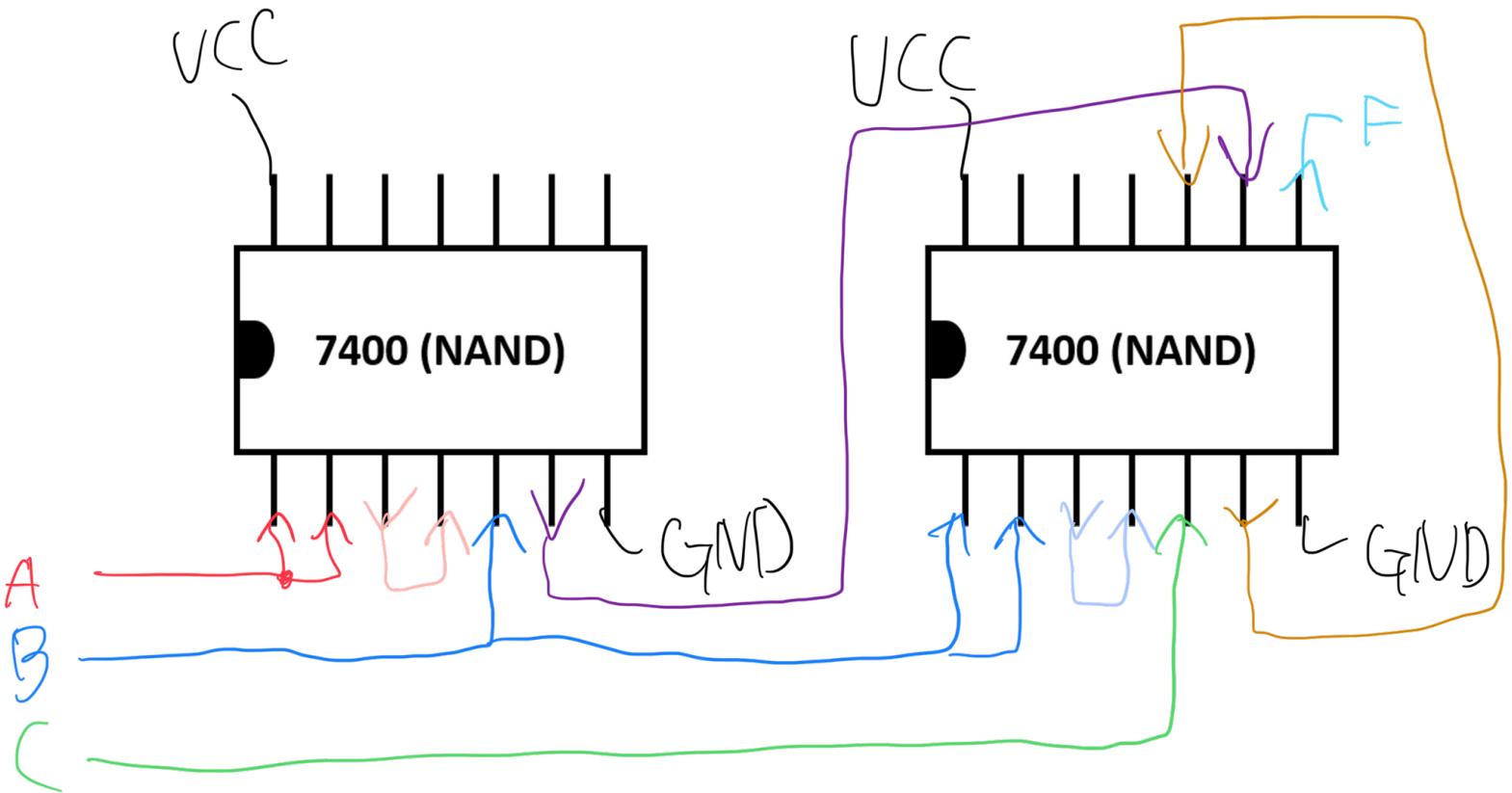
In-Lab Exercise

5. Draw the circuit from Problem 2 using the chips below (label each input/output, some chips may not be needed).



6. Implement the circuit from Problem 5 on the breadboard.

7. Draw the circuit from Problem 4 using the chips below (label each input/output, some chips may not be needed).



8. Implement the circuit from Problem 7 on the breadboard.

Remember to demonstrate your in-lab results to TAs