(60 pts) Approx. 4 days

The second part of our unit is all about the universal "NAND" and "NOR" gates. A NAND gate is simply the *negation* (or opposite) of an AND gate… the NAND gate is only off (0) when both inputs are on (1). Similarly, the NOR gate is the *negation* (or opposite) of an OR gate… the NOR gate is only on (1) when both inputs are off (0). The advantage to these gates is that they can be grouped up in very specific ways to replace the AND/OR/INVERTER gates we've been using.

1. Start by watching the *Universal Gates Overview* and *NAND Gates* presentations. Take a full page of notes (at least) on the NAND gates and their use. Make sure that part of your notes includes the details about how to substitute NAND-only groupings for the AOI gates we've been using.
2. Complete the *NAND Gates Assignment*, showing your work throughout!
3. Then, use Multisim to simulate the two circuits (Booth-NAND, Alarm-NAND) and confirm that they work as they are supposed to.
4. Breadboard the same two circuits and demonstrate that they work correctly. Have Mr. Benshoof check-off your working breadboarded circuits!
5. Move on by watching the *NOR Gates* presentation and taking another page of notes. Make sure that your notes include details about substituting all-NOR groupings for the AOI gates we're used to!
6. Complete the *NOR Gates Assignment*, showing your work throughout!
7. Then, use Multisim to simulate the two circuits (Booth-NOR, Alarm-NOR) and confirm that they work as they are supposed to.
8. Breadboard the same two circuits and demonstrate that they work correctly. Have Mr. Benshoof check-off your working breadboarded circuits!
9. Take the Unit 3 Quiz **by October 11!**

Part 2: Tasks	*5 points*	*4-3 points*	*2-1-0 points*
Notes on NAND Gates	+ You took a full page of notes on NAND gates. + Your notes include details about how NAND gates can substitute AOI	- Your notes are less than a full page - Your notes do not include NAND substitutions	- Very brief or no notes
	10 points	*8-5 points*	*4-0 points*
NAND Gates Assignment	+ You completed the NAND Gates Assignment	- You did not complete the NAND Assignment	- Your NAND Assignment is missing
Multisim & Breadboard NAND	+ You completed the Multisim circuit for your NAND-only circuit + You completed the breadboarding for the circuits	- You did not complete the Multisim circuit - You did not complete the breadboarding	- You did not complete the breadboarding or Multisim circuits
	5 points	*4-3 points*	*2-1-0 points*
Notes on NOR Gates	+ You took a full page of notes on NOR + Your notes include details about how NOR gates can substitute for AOI gates	- Your notes are less than a full page - Your notes do not include NOR substitutions	- Very brief or no notes
	10 points	*8-5 points*	*4-0 points*
NOR Gates Assignment	+ You completed the NOR Gates Assignment	- You did not complete the NOR Assignment	- Your NOR Assignment is missing
Multisim & Breadboard NOR	+ You completed the Multisim circuit for your NOR-only circuit + You completed the breadboarding for the NOR circuits	- You did not complete the Multisim circuit - You did not complete the breadboarding	- You did not complete the breadboarding or Multisim circuits
Unit 3 Quiz	+ You took the Unit 3 Quiz by the due date + Your grade is based on number correct	N/A	- You did not take the Unit 3 Quiz