YOUR NAME:

NETID:

EMAIL:

COLLABORATORS NAMES:

**How Computers Work Lab**

# **Lab Notebook Questions**

All of the required questions are listed here for you to reference. Be sure to answer each question completely, including an explanation of how you arrived at your answer.

Q1: Describe your experience attempting each of the tasks. What went well? What was challenging? What lingering questions do you have about how circuits and logic gates work? Include an image of your final logic gate system involving 2 levels of gates with the output state being 'ON' and explain what is happening at each level to make turn the output state 'ON'.

Q2: Based on the settings of the bus addresses, what values do you expect to show along the A and B bus?

Q3: What happens when you click Execute? Are the A bus and B bus values what you expected? Why or why not?

Q4: What do you think will happen to the boxes when the result is less than zero?

Q5: With the values of R1=42 and R2=31 that you input earlier, what do you expect the result C to be?

Q6: Is the result what you expected? Why or why not? What happened to the diagnostic boxes?

Q7: Describe what happened and the output in the previous step.

Q8: What settings (e.g., knob positions) would cause the value stored in R3 to be doubled?

Q9: Set R3 to 12 and test your answer to Q8? Did your hypothesis hold true? Why or why not?

Q10: Based on these settings, what do you think will happen when you click Execute?

Q11: What settings (bus addresses, ALU operation, switches, and memory RW) would result in R0 minus R3 being stored in memory location 4?

Q12: Using the Instruction Set from step 40, how would you start translating the ADD R2 R1 R0 instruction from assembly or machine language to binary language?

Q13: How does your answer to Q12 compare to the simulator output from step 44? What discrepancies (if any) can you identify?

Q14: Using the Instruction Set from step 40, how would you start to translate the binary instruction (or machine code) 1000001001001010 into assembly language or instructional language?

Q15: How does your answer to Q14 compare to the simulator output from step 48? What discrepancies (if any) can you identify?

Q16: What do you expect to be the result when you click Execute? Run the simulation and verify your prediction.

Q17: What would happen if you had forgotten the HALT instruction? How would the control unit react?