Physics 4700 Experiment 7 Digital Circuits

1) A small company has 100 shares of stock divided among 4 people. Each share entitles its owner to a vote. The shares are divided as follows:

Mr. A 10 shares

Ms. B 20 shares

Mr. C 30 shares

Ms. D 40 shares

A measure that has been voted on passes if there is a two thirds majority. Each person votes with all of their shares (1) or none of their shares (0). Write out the truth table for all possible votes. Construct the logic equation for the votes and use Boolean algebra to simplify the equation. Design a circuit for the voting. Hint: To simply your equation, you might wish to use C = C + C, i.e. ABCD = ABCD + ABCD.

2) Using 3 JKFF's build a circuit that counts from zero to seven, i.e. 0,1,2,3,4,5,6,7,0,1... Connect the output and clock to a logic analyzer and include the analyzer output in the report to prove that your circuit is working.

3) Simulate a Digital to Analog Conversion (DAC) using a Weighted Resistor Ladder (Lecture 10):



Summarize your result in a table for all possible input combinations.

4) Simulate a DAC using a Binary Ladder Network (R-2R Network, Lecture 10):



Summarize your result in a table for all possible input combinations.