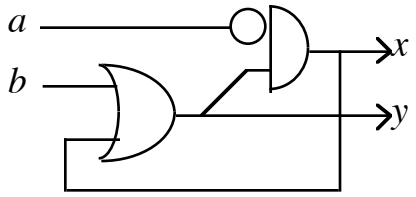
CSC258 Computer Organization 2015 fall
Assignment 2 due Thu.Nov.5 at 6pm in BA2220

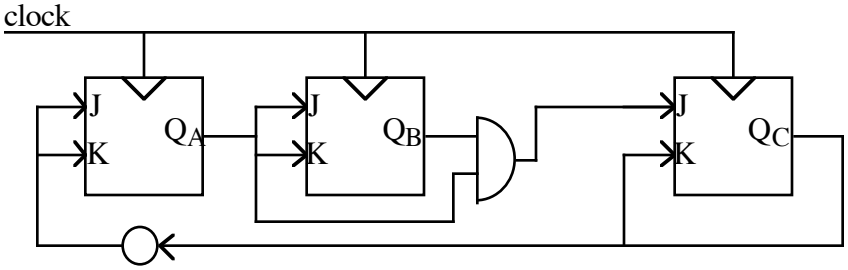
1 Consider the following circuit.



(a)[4] When the input is $a=\perp$ and $b=\perp$, what are the stable states? Express your answer by saying what the outputs x and y are.

(b)[6] For each stable state, what do the outputs become after you apply a pulse ⎍⎍⎍
(i) to the a input?
(ii) to the b input?
(iii) to both a and b inputs? Remember that it is not possible to ensure perfect simultaneity.

2[4] The following sequential circuit is initially in the state $Q_A=\top$ and $Q_B=\top$ and $Q_C=\top$.



A sequence of clock pulses is applied to the circuit. Draw a graph that describes the state of the circuit (Q_A , Q_B , and Q_C) as a function of time (at least 8 pulses).

3[15] A voting machine has 2^n inputs and n outputs. The outputs represent the number of votes. Each input represents a button; pressing it and then unpressing it sends a pulse. One of the input wires is labeled r for "reset"; pressing r sets the output to 0. Pressing any other input button increases the vote count by 1, unless it has already been pressed since the last reset, in which case it is ignored. If two or more votes are cast at the same time, they all count. Implement the voting machine using any circuits (such as adders) we have covered in class. You may choose a specific value of n for drawing your circuit, but it should be clear how to generalize to any value of n.

4 Convert the following numbers to IEEE single-precision floating point.
(a)[2] –42
(b)[2] 3.14

5[2] Convert the following number from IEEE single-precision floating-point to base ten sign and magnitude integer.fraction with 5 significant digits.
0 10000011 01011010110101101011010

assignment continues on next page

6 Perform the following arithmetic conversions and subtraction.
(a)[2] Convert –5/6 into binary quote notation.
(b)[2] Convert 7 into binary quote notation.
(c)[2] In binary quote notation, from –5/6 subtract 7 .
(d)[2] Convert the answer to (c) back to a usual decimal notation.

7[6] The message “do it” must be sent using the ASCII code of 7 bits per character, plus the ability to correct 1 error bit per character. Show exactly what bits are sent. At the receiving end, the third bit of the third character is flipped; show how this error is detected and corrected (no circuitry; just explain).

end of assignment