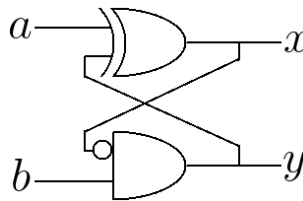


CSC258 Computer Organization (Winter 2009) Assignment 2

Due Monday, March 9 at 6:00pm in BA2220

1 [10] What are the stable states for the following circuit? Explain.



2 [15] A vending machine sells coffee at \$2. It accepts only \$1 and \$2 coins.

- If a \$2 coin is inserted, the coin is immediately transferred into the money collector and a cup of coffee is dispensed.
- If a \$1 coin is inserted, this coin is temporarily held in a small compartment with two outlets. After this
 - if the cancel button on the vending machine is pressed, the coin is returned via Outlet 1 and no coffee is dispensed;
 - if another \$1 coin is inserted, Outlet 2 is opened, transferring both coins into the money collector, and a cup of coffee is dispensed;
 - if a \$2 coin is inserted, then a cup of coffee is dispensed, and Outlet 1 opens to return the \$1 coin, whereas the \$2 coin is immediately transferred into the money collector.

Make your assumption about the input and output signals, and design a circuit for the controller of this vending machine.

[Hint: Three inputs (\$1 coin sensor, \$2 coin sensor, cancel button) and three output (Outlet 1 controller, Outlet 2 controller, coffee valve) signals are needed.]

3 (a) [5] Convert 1 01111110 11001100110011001100110 from IEEE single-precision floating-point to decimal representation with 5 significant digits.

- (b) [5] Convert decimal number 2.58 into IEEE single-precision floating-point.
(c) [5] Add the floating-point numbers given in part (a) and the one you obtained in part (b). Show all stages of your calculation. Note: you are working with bit patterns at all stages.

4 [10] The message “RW110” must be sent using the ASCII code of 7 bits per character, plus the ability to correct 1 error bit per character. (Correction by decoding; no resending.)

- (a) Show exactly what bits are sent.
(b) At the receiving end, the fifth bit of the second character is flipped; show how the error in this character is corrected (no circuitry; just explain).