

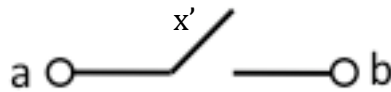
CSCE 434/834, Fall 2010

Homework 1 (Due Sept 3)

Note: In the class, I used the following schematic to denote a normally-closed switch controlled by binary variable x :

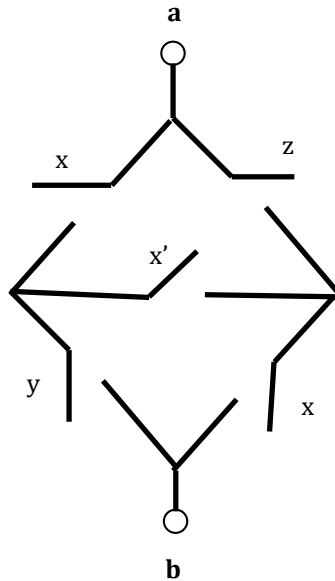


The following is an alternative way of representing a normally-closed switch, which is what I use in the problems below:



Problem: A five-part problem:

(a) For the following two-terminal *bridge* network, determine the transmission function $T(a,b)$ as a Boolean expression and a truth table.



(b) Simplify the Boolean expression in part (a) so as that the resulting expression has the fewest possible *literals* (every occurrence of a variable or its complement counts as a literal).

(c) Based on the simplified Boolean expression in part (b) , derive the simplest possible *series-parallel* switch network implementing the same Boolean function as the transmission function between its two terminals.

(d) Instead of the transmission function in part (c), it is desired to implement the Boolean function in the form of a complementary switch-network *gate* with the output corresponding to the logical values of the function. Derive an implementation and show why it is correct. Note that you can freely use normally-open and normally-closed switches in this implementation.

(e) Implement the *complement* of the Boolean function, as in part (d), but observe the constraints that the switch network used to transmit logical 1 (0) is composed of only normally-closed (normally-open) switches.