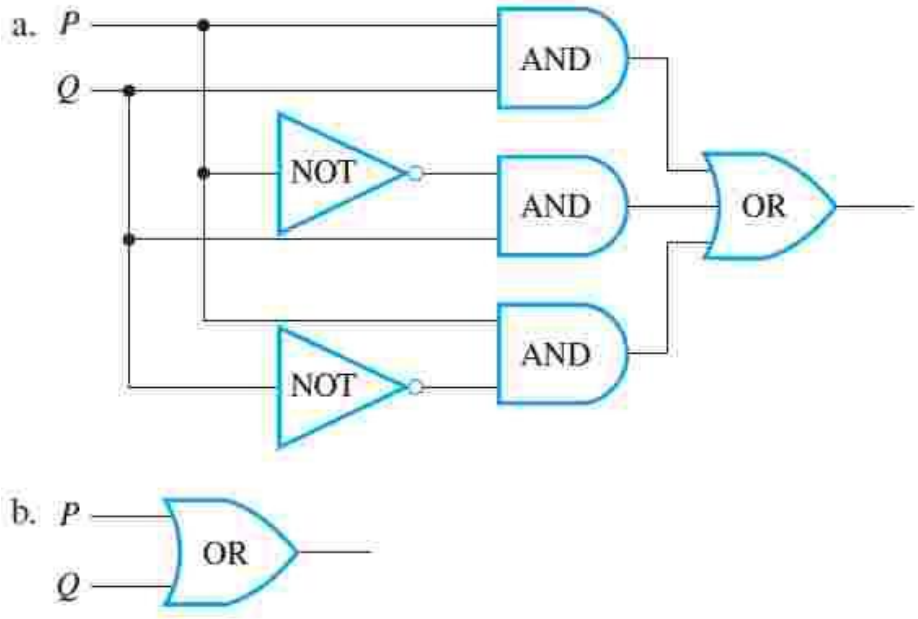
CPSC 121 Tutorial Handout 1

1. Are the following circuits logically equivalent?



The two circuits are equivalent (check via truth table).

2. You are traveling in a country where every inhabitant is either a truthteller who always tells the truth or a liar who always lies. You meet two of the inhabitants of this country, Bart and Homer. Bart says, ``At least one of us is a liar.'' Can you tell whether Bart and Homer are liars or truthtellers? If so, what are they, and how do you know for sure? If not, why not? (No need for a formal proof, but your reasoning should still be clear and irrefutable.)

Here's a fun way to solve this one. Say Bart was a liar. Then, his statement ``At least one of us is a liar.'' is true. (Bart is the ``witness'' to the statement's truth.) However, Bart the liar cannot possibly make a true statement. That's a ridiculous, contradictory result. Therefore, Bart cannot have been a liar.
So, either Bart's a truthteller or the problem is impossible.
Say Bart's a truthteller. Then, his statement ``At least one of us is a liar.'' is true. Since he isn't a liar, Homer must be. Since Homer hasn't opened his mouth, we have no evidence he isn't a liar.
Thus, Bart as a truthteller and Homer as a liar is the only viable solution.

3. Rewrite the following statements in if-then form.
    a. Catching the 8:05 bus is a sufficient condition for my being on time for work.

    If I catch the 8:05 bus, then I will be on time for work.

    b. Payment will be made on the fifth unless a new hearing is granted.

    If a new hearing is not granted, then payment will be made on the fifth.