CS 611 : Discrete Algorithms for Mobile, Wireless and Ad Hoc Networks

Spring Semester, 2007
PROBLEM #3
Due Date: Thursday, April 20

We define the *abstract partial reversal algorithm* as follows. Each node u maintains a list L_u of neighbors v that have fired and reversed edge (u, v) since the last time u fired.

Initially, all these lists are empty. Then, at each step, some set of sinks fire.

For each such sink u, let N_u be the neighbots of u. Now,

- if $N_u - L_u \neq \emptyset$, then u reverses all links (u, v) where $v \in N_u - L_u$.
- if $N_u = L_u$, then reverse all links.

We also defined the *concrete partial reversal algorithm* where each node u is associated with a triple (α_u, β_u, u).

When u fires, it sets $\alpha_u := min\{\alpha_v\} + 1$, over all v in N_u. Also, it sets $\beta_u := min\{\beta_v\} - 1$, over all v in N_u such that α_v is equal to the new α_u.

Prove that the concrete algorithm correctly emulates the abstract algorithm.