Homework Assignment 1, Part b

Due: Friday, September 21,2001 at 11 in NE43-441.
Office hours: Office hours next week are Thursday, 11-1.

Reading:

Sections 3.5-3.6, 4.1-4.4, and 5.1 of *Distributed Algorithms.* (Optional) Attiya-Welch, Sections 2.4-2.5.

Basic Problems:

1. a. Show that in the bit reversal ring of size 2^k, any segment S of length $l = 2^{k'}$ for $k' \leq k$ is order equivalent to $(n/l) - 1$ disjoint segments of length l (which do not include S).
   b. Use (a) to solve question 3.16 from the book.

2. Exercise 4.17

Regular Problems:

3. Exercise 4.6.
   The main point of this exercise is to get some practice defining and using a simulation relation.

4. Exercise 4.10, part (a) only.

5. Design an algorithm to produce a depth-first spanning tree starting at the root. It should be similar to the one discussed in class, but should have time complexity $O(n)$ rather than $O(|E|)$.
   Hint: When a node receives the token for the first time, it notifies all its neighbors, but passes the token to only one of them. Give pseudocode, and give a convincing argument for why your algorithm is correct and has the claimed time bound.

6. Exercise 5.1