Due on Monday Dec 25. Don’t forget to keep a copy of the homework.

1. Construct an infinite family of graphs on which the $O(m\beta(m,n))$ minimum spanning tree algorithm of Fredman and Tarjan takes $\Omega(m\beta(m,n))$ time.

2. Augment the redundant binary counters shown in class to support both increment and decrement in $O(1)$ worst case time. Describe the algorithm that decrements the counter and establish its correctness.

3. Prove that a sequence of $m$ intermixed insertions and deletions (where the point of insertion or the item to be deleted are given) into an initial 2-4 tree with $n$ nodes takes $O(m+n)$ time.

4. Describe a split algorithm for 2-4 trees and prove that each split takes $O(\log n)$ time in the worst case.

5. Extend the data structure described in class for the “order maintenance” problem to a more efficient data structure in which every operation costs $O(1)$ amortized time.