EECS 560: Homework 4
Due: Wednesday, November 4, 2015 (At the beginning of lecture)

Note: You must show all of your work to obtain credit for a problem. Partial credit will be given when meaningful answers were given.

Questions:

1. (15 points) Consider a leftist tree $T$ with $n$ internal nodes. Prove that the path from the root of $T$ downwards to the rightmost external node contains at most $\lfloor \log_2(n + 1) \rfloor$ nodes.

2. (15 points) Given a set $H$ of 12 records with keys $\{3, 7, 18, 13, 32, 55, 51, 29, 25, 12, 16, 73\}$. Construct a min pairing heap for $H$ by inserting the elements in $H$, in the given order, into an initially empty heap. When done, perform deleteMin once and then merge the resulting trees together using the multi-pass method as discussed in class. Illustrate the data structures of the final pairing heap.

3. (15 points) Given a set of 12 records with keys $H = \{3, 7, 18, 13, 32, 55, 51, 29, 25, 12, 16, 73\}$. Build a min leftist heap for $H$ by inserting the records, in the given order, into an initially empty leftist heap. When done, delete min once and then illustrate the data structure of the final leftist heap. You must show all your steps, and trees, clearly for credit.

4. (15 points) Given a set of 12 records with keys $H = \{3, 7, 18, 13, 32, 55, 51, 29, 25, 12, 16, 73\}$. Build a min skew heap for $H$ by inserting the records, in the given order, into an initially empty skew heap. When done, delete min once and then illustrate the data structure of the final skew heap. You must show all your steps, and trees, clearly for credit.

5. (15 points) Given a set of 12 records with keys $H = \{3, 7, 18, 13, 32, 55, 51, 29, 25, 12, 16, 73\}$. Build a binomial queue for $H$ by inserting the records, in the given order, into an initially empty queue. When done, delete min twice and then illustrate the data structure of the final binomial queue. You must show all your steps, and trees, clearly for credit.