ENPM809X Homework #4
due April 27, 2023 4:00pm

1) (Exercise 18.2-3) (25 pts) Explain how to find the minimum key stored in a B-tree and how to find the predecessor of a given key stored in a B-tree.

2) (Exercise 19.2-1) (25 pts) Show the Fibonacci heap that results from calling FIB-HEAP-EXTRACT-MIN on the Fibonacci heap shown in Figure 19.4(m) in the textbook.

[Note: Insert the children to the left of *H.min*, extract the node, and move *H.min* to the right, as in FIB-HEAP-EXTRACT-MIN. When processing the root list, always start with *H.min* and follow the right pointers.]

3) (from Exercise 22.2-9) (25 pts) Let $G = (V, E)$ be a connected, undirected graph. Give an $O(V + E)$-time algorithm to compute a path in G that traverses each edge in E exactly once in each direction.

[Note: This is similar to finding your way out of a maze if you are given a large supply of pennies. Also, although the textbook has this question in 22.2, it may be a better fit for the next section.]

4) (Exercise 23.1-3) (25 pts) Show that if an edge (u, v) is contained in some minimum spanning tree, then it is a light edge crossing some cut of the graph.