# Problem Set 4

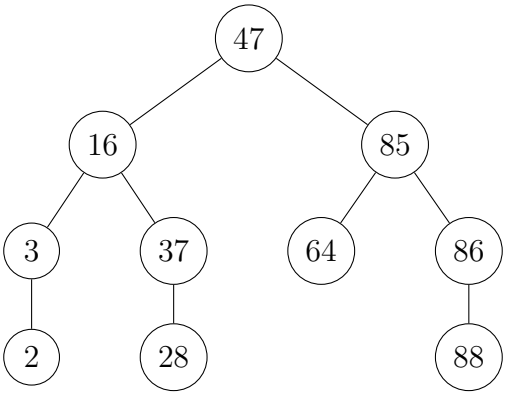
**Name:** BUAA-TYZ

**Collaborators:** None

**Problem 4-1.**

**(a)** Node(37): Scew = 2 - 0 = 2 Node(16): Scew = 1 - 3 = -2

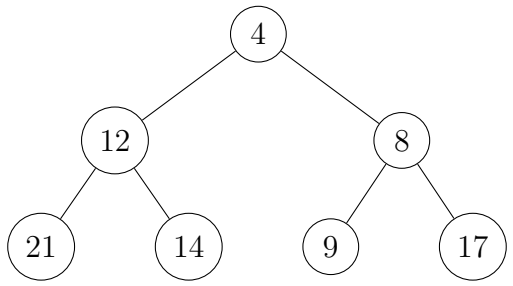
**(b)**




**(c)** Just do a rotation.

**Problem 4-2.**

**(a)**




Minheap

**(b)** Maxheap

**(c)** Swap (13, 0) and then (2, 0)

**(d)** Minheap

**Problem 4-3.**

**(a)**
- Build a heap according to score: $O(|A|)$
- Delete max k times: $O(klog|A|)$

**(b)** Use heap tree properity to search the heap.

**Problem 4-4.** $s_i$: address of farm $c_i$: capacity $b_j$: name of building $d_j$: demand of building

•A hash table to record $(s_i, node)$ pair.

•For each node, a hash table to record $(b_j, "")$ pair.

•An max heap to store all node based on $c_i$.

Build: $O(n)$ Power on: Find a node corrsponding to the condition $O(logn)$, add the name to the hash table of the node. Change the capacity to $c_j - d_j$ Power off: Find the node $O(logn)$, delete it in the hash table: $O(1)_{am}$ Customers: Use hash table to find the node and return the hash table of the node.

**Problem 4-5.** Pass problem 5 and 6, use the time to see the implementation of AVL Tree.

**Problem 4-6.**

**(a)**

**(b)**

**(c)**

**(d)** Submit your implementation to `alg.mit.edu`.