

COMP 157 Assignment 6

Exercises 6.3:

5. **a.** For an AVL tree containing real numbers, design an algorithm for computing the range (i.e., the difference between the largest and smallest numbers in the tree) and determine its worst-case efficiency.
- b.** True or false: The smallest and the largest keys in an AVL tree can always be found on either the last level or the next-to-last level?

Exercises 6.4:

3. **a.** Find the smallest and the largest number of keys that a heap of height h can contain.
- b.** Prove that the height of a heap with n nodes is equal to $\lfloor \log_2 n \rfloor$.

Exercises 6.6:

10. Consider the two-dimensional *post office location problem*: given n points $(x_1, y_1), \dots, (x_n, y_n)$ in the Cartesian plane, find a location (x, y) for a post office that minimizes $\frac{1}{n} \sum_{i=1}^n (|x_i - x| + |y_i - y|)$, the average Manhattan distance from the post office to these points. Explain how this problem can be efficiently solved by the problem reduction technique, provided the post office does not have to be located at one of the input points.

Submission Requirements:

- All submissions must be typeset. No handwritten work will be accepted.
- Word or PDF formats are preferred. If submitting documents in another format, include a separate text note indicating tools needed to read the document.