

**Problem 5****(50 marks)**

Answer the following questions in one or two sentences:

- a. How can we construct a tree where all nodes have the same degree? [4]

**5a)**

- b. What is the difference between l-value and r-value references? [6]

**5b)**

- c. What is a key concept of an abstract data types? [4]

**5c)**

- d. How do we define mutual dependent classes in C++? [4]

**5d)**

- e. What must a value-based data type define in C++? [2]

**5e)**

f. What is an object adapter? [6]

5f)

g. What is the difference between copy constructor and assignment operator and how do we guarantee safe operation? [8]

5g)

h. What is the best-case, average-case, and worse-case for a lookup in a binary tree? [6]

5h)

i. What are reference data members and how do we initialize them? [2]

5i)

j. You are given  $n-1$  numbers out of  $n$  numbers. How do we find the missing number  $n_k$ ,  $1 \leq k \leq n$ , in linear time? [8]

5j)