COMPUTER SCIENCE TRIPOS  Part Ia – 2013 – Paper 1

1   Foundations of Computer Science (LCP)

(a)  Write brief notes on ML datatypes and pattern-matching in function declarations.                                                                    [6 marks]

(b)  A binary tree is either a *leaf* (containing no information) or is a *branch* containing a label and two subtrees (called the *left* and *right* subtrees). Write ML code for a function that takes a label and two lists of trees, returning all trees that consist of a branch with the given label, with the left subtree taken from the first list of trees and the right subtree taken from the second list of trees.                                                                                              [6 marks]

(c)  Write ML code for a function that, given a list of distinct values, returns a list of all possible binary trees whose labels, enumerated in inorder, match that list. For example, given the list [1,2,3] your function should return (in any order) the following list of trees:
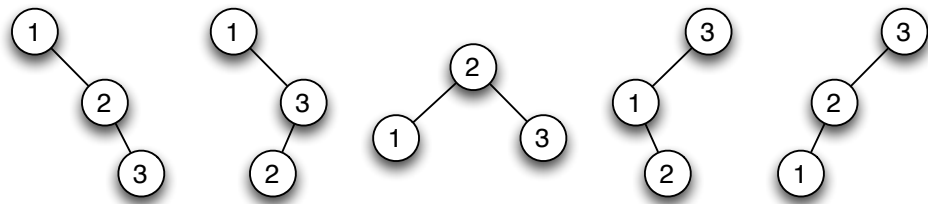


[8 marks]

All ML code must be explained clearly and should be free of needless complexity.