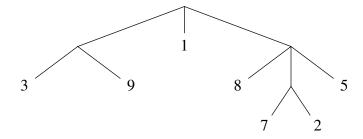# 1993 Paper 10 Question 3

Common Lisp

Consider trees that have two kinds of nodes. A node is either a **leaf**, labelled by a number, or a **branch**, and has one or more subtrees. For example:

One imagines that the edges from each branch node are numbered from left to right starting from 0. A list of these numbers thus designates the path from the root to a node. In the tree shown above, the path (2 1 1) designates the path to the node labelled 2.

(*a*) Describe a good representation for such trees in Lisp.   [3 marks]

(*b*) Write a Lisp function `getnode` such that (`getnode` *path tree*) returns the node of *tree* designated by *path*, assuming that the tree contains such a node.
[5 marks]

(*c*) Write a Lisp function `maxpath` such that (`maxpath` *tree*) returns the maximum of the leaf nodes in the tree, together with the path to that node. For the tree shown above, `maxpath` should return 9 as the maximum and (0 1) as the path.
[12 marks]