

1993 Paper 3 Question 7

Data Structures and Algorithms

A *strictly binary tree* is a binary tree in which every node that is not a leaf has two children. Suppose that for a strictly binary tree there exists $c > 1$ such that the ratio of the lengths of any two root-to-leaf paths is no greater than c .

For a tree of height h , derive the upper and lower bounds on N , the number of nodes in the tree. [15 marks]

Suppose instead that every node that is not a leaf has n children. What then would be the upper and lower bounds? [5 marks]