

2002 Paper 1 Question 1

Foundations of Computer Science

This question has been translated from Standard ML to OCaml

Consider the following OCaml declarations, involving binary trees:

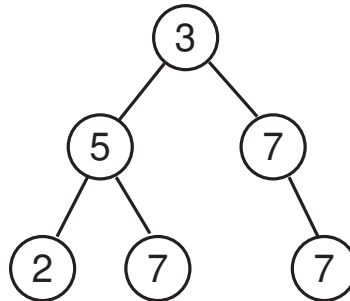
```
type 'a tree = Lf
             | Br of 'a * 'a tree * 'a tree

exception E

let rec path = function
  | Lf -> raise E
  | Br(v, t1, t2) ->
    try
      if v = 7 then []
      else 1 :: path t1
    with E -> 2 :: path t2
```

- (a) The function `path` returns a path (a list of 1s and 2s) to an occurrence of the number 7 in the tree. Carefully explain how `path` works, taking the tree shown below as an example and indicating which occurrence of 7 will be found.

[5 marks]



- (b) Code the function `paths`, which returns the list of all paths to 7s in a binary tree.

[5 marks]