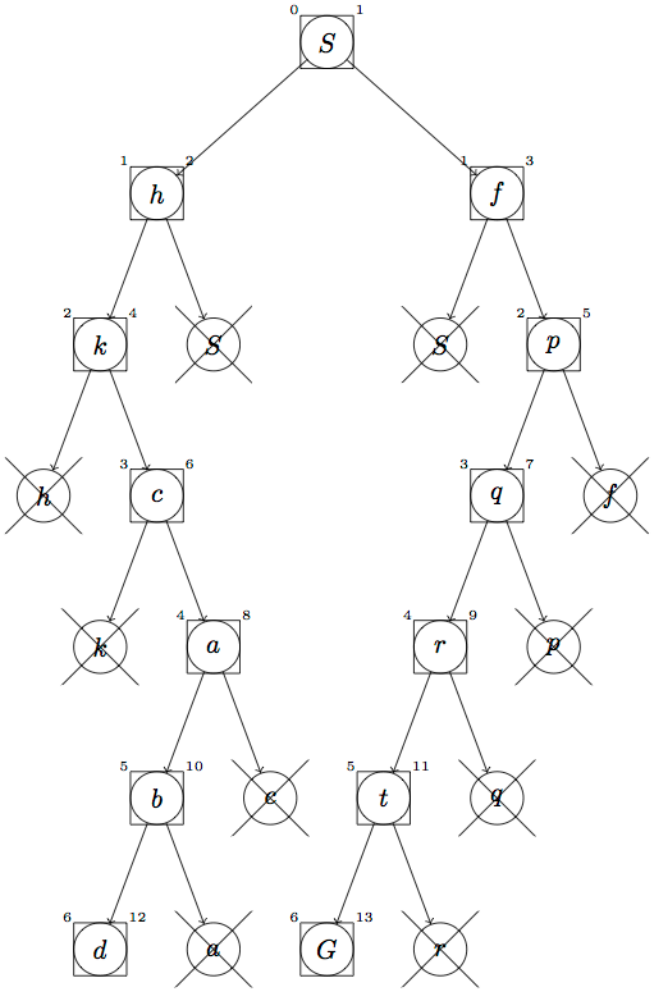
# Exercise 4

In the following maze, the successors of a cell include any cell directly to the east, south, west, or north of the current cell except that no transition may pass through the central barrier. The search problem is to find a path from $S$ to $G$.

| | | | | | |
|---|---|---|---|---|---|
| | | | $a$ | $b$ | |
| | | | $c$ | $d$ | $e$ |
| $f$ | $S$ | $h$ | $k$ | $m$ | $n$ |
| $p$ | $q$ | $r$ | $t$ | $G$ | |

1. Examine the order in which cells are visited by **Breadth-first Graph Search**. Here, we always try to expand East first, then South, then West, then North.



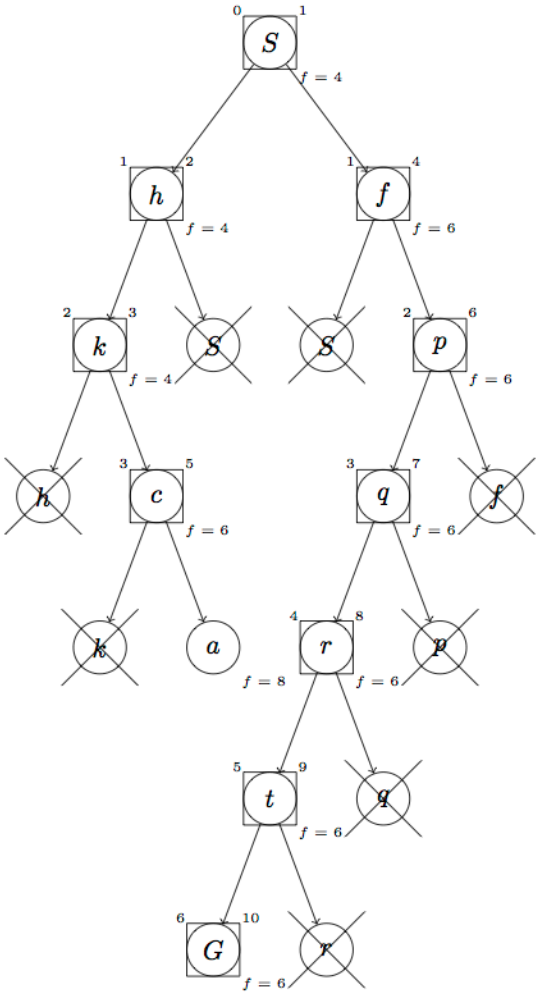

The order in which cells are visited are $S \to h \to f \to k \to p \to c \to q \to a \to r \to b \to t \to d \to G$.

The solution is $S \to f \to p \to q \to r \to t \to G$.

2. Examine the order in which cells are visited by **A* Graph Search**. We use a Manhattan distance metric heuristic function.

$$h(s) = \text{shortest number of steps from state } s \text{ to } G$$

We also use the same expanding order as the previous problem.




The order in which cells are visited are $S \to h \to f \to k \to p \to c \to q \to a \to r \to t \to G$.
The solution is $S \to f \to p \to q \to r \to t \to G$.