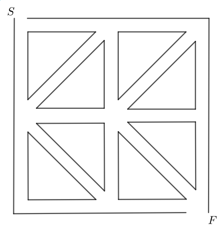


Problem of the Week

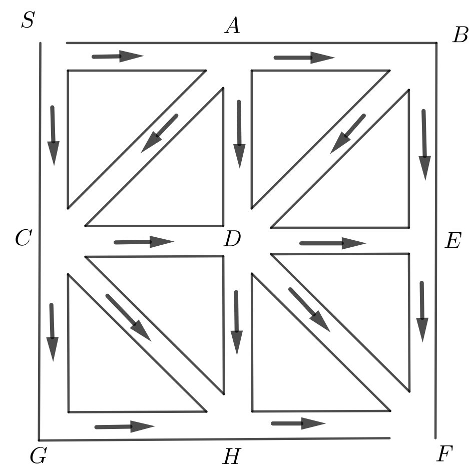
Problem D and Solution

More Garden Paths

Problem

In a garden, Levi travels through the labyrinth shown above from Entrance to Exit. He is only allowed to travel east, south, southeast, or southwest along a path. (He is never allowed to travel north, northeast, northwest, or west.) How many different routes can Levi take from Entrance to Exit?

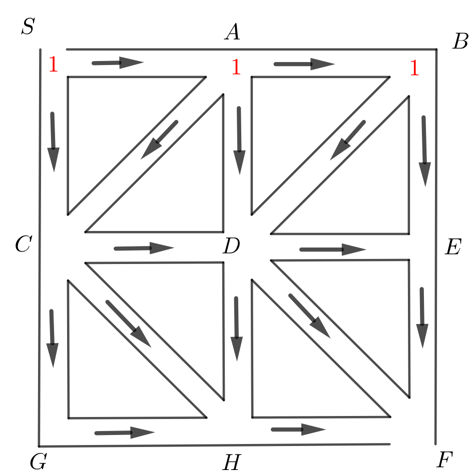
Solution



We begin by labelling the Entrance with the letter S for Start and the Exit with the letter F for Finish. We will then label the other seven intersections in the maze as A, B, C, D, E, G, and H, as shown. We will also place arrows on the paths to show the direction in which Levi can travel.

We shall then keep track of the number of routes from S to each intersection. We will place the number of routes at each intersection as we go. We will work across three different horizontal levels.

Level 1



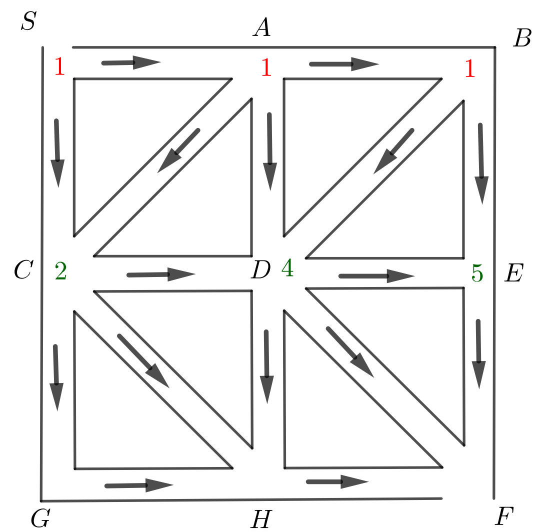
When we start at S there is only one route to A and only one route to B. Therefore, we place a 1 at A to keep track of the number of routes from S to A. We also place a 1 at B to keep track of the number of routes from S to B. Note: There is 1 route from S to S.

Level 2

To get to C, Levi could come directly from S or through A. To find the number of routes from S to C we need to sum the number of routes from S to S and the number of routes from S to A. Therefore, the number of routes is $1 + 1 = 2$. We place a 2 at C to keep track of the number of routes from S to C.

To get to D, Levi must come from either A, B or C. Therefore, the total number of routes from S to D is $1 + 1 + 2 = 4$. We place a 4 at D to keep track of the number of routes from S to D.

To get to E, Levi must come from B or D. Therefore, the total number of routes from S to E is $1 + 4 = 5$. We place a 5 at E to keep track of the number of routes from S to E.

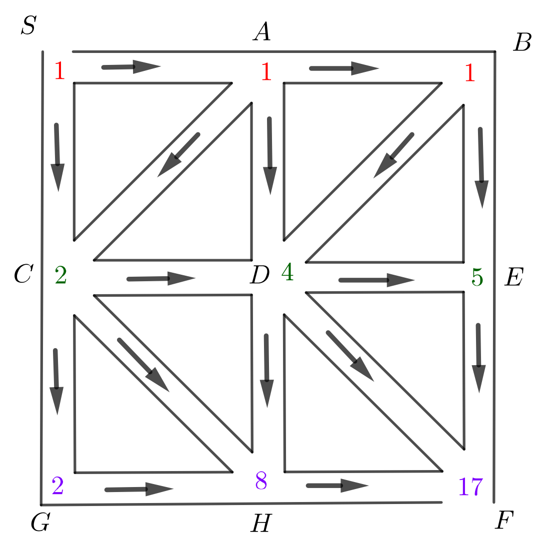


Level 3

To get to G, Levi must come from C. Therefore, there are only 2 routes from S to G. We place a 2 at G to keep track of this.

To get to H, Levi must come from either C, D or G. Therefore, the total number of routes from S to H is $2 + 4 + 2 = 8$. We place an 8 at H to keep track of the number of routes from S to H.

To get to F, Levi must come from D, E or H. Therefore, the total number of routes from S to F is $4 + 5 + 8 = 17$. We place a 17 at F to keep track of the number of routes from S to F.



In total, there are 17 different routes that Levi can take from Entrance to Exit.