This is the nineteenth homework assignment.

This assignment asks you to write a program that can take a maze and calculate the shortest distance from the starting point.

This slide shows what needs to be done. The left side shows an input. It is composed of letter bee, meaning a brick, letter ass, meaning the starting point, and space, meaning a passage way.

The program’s output is numbers of steps from the starting point. This maze is divided into cells. Each cell is either a brick or a passage way.

Please notice that it is possible that a passage way may be enclosed by bricks as shown in this slide.

The output of the program is the following: If a cell is a brick, it is set to -1. The other cells are set to the product of the width and height plus one. This value is greater than the largest possible distance from the starting point.

The program needs to find the starting point, marked as ass. The distance is zero.

Then, the distance increases by one for every cell.

In this example, as the program moves from the starting point towards left, the distance increases.

The path encounter a brick and cannot move left further. Then, the program can move up, increasing the distance from 6, to 7, to 8.

The program encounters a brick and cannot move further up. At this point, the program may move left or move right. Please notice that the left and the right have the same distance of 9.

Homework 19 asks you to write a program that can calculate the distances from the starting point.

As a hint, recursion will be a natural way to solve this problem. The stop condition is when entering a dead end and cannot move forward. The recurring pattern is that the problem looks similar at every cell. At every cell, the program needs to decide which cell to go to. Sometimes, there are branches. In this example, the program can go left or right. This is a branch. The change is that every step moves farther and farther away from the starting point.