

SPADES

ROUND 1

TECHWARS

DIFFICULTY LEVEL: HARD

CODING PROBLEMS

Question One:

Description

There has been a new virus outbreak. Knowing that the virus has mutated from a previous strain called EE-1, scientists are trying to find the common ancestor of the new virus and EE-1 to develop a new vaccine. The scientists have an extensive database of virus strains in their DNA codes. They need you to write a program that will determine the common ancestor for the two DNAs given below.

DNA code of new virus: "md9_ggy"

DNA code of EE-1: "ggh_mln"

A virus DNA is coded as a pair of identifiers separated by an underscore character. Each identifier is 3 characters long. For example, 000_abc is a description of a virus. When a virus evolves from another, it takes its second part of the DNA description as its first. For example,

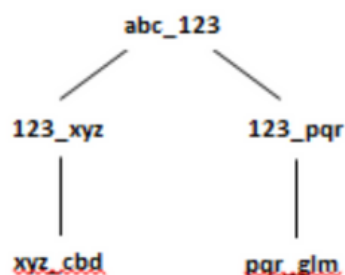
abc_x1z evolved from 000_abc. The second (right) part of the DNA of any virus is always unique and is never repeated.

You are required to provide the position number of the common ancestor in the following list.

You are required to **provide the position number** of the EE-1 in the following list :
{ "w45_kj3", "psc_mjk", "xyk_470", "333_mkb", "r90_ssm", "hju_355", "rym_klm", "ert_333", "aio_ios", "589_psc", "pqr_ggh", "470_s10", "qmt_ert", "mg3_445", "xyz_tmt", "s1s_md9", "qmt_xyk", "s10_r90", "110_qmt", "ssm_pqr", "tpo_789", "mkb_589", "mjk_s1s" };

Note that "psc_mik" is position 1

Example:



Viruses with DNA codes xyz_cbd and pqr_glm have the common ancestor abc_123

Question Two:

Description:

Write a program in your preferred programming language to generate the Pascal's Triangle with 'n' number of rows, where 'n' is an integer taken as input from the user. Pascal's Triangle is a mathematical pattern that starts with a 1 at the top, and each number in the triangle is the sum of the two numbers directly above it.

Example:

```
      1
     1 1
    1 2 1
   1 3 3 1
  1 4 6 4 1
 1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
```

Question Three:

With a map and a heart filled with determination, Liza stepped into the labyrinth. As she ventured deeper, Liza soon found herself at the 'S' symbol on the map—the starting point. This marked the beginning of her epic journey to claim the Chalice of Eternal Wisdom. However, the maze was filled with perils and blocked paths. She quickly realized that to succeed, she needed to find the shortest path to the exit marked 'E.'

But the labyrinth had its challenges. It was riddled with mysterious barriers, symbolized by '1,' representing impenetrable walls. Liza had to navigate these barriers, finding a way through the intricate labyrinth. She also noticed that some paths led to dead ends while others stretched into infinity, confusing her every step of the way.

Your task is to help Liza by writing a program that takes the labyrinth's map as input and determines the shortest path from 'S' to 'E' while respecting the walls and the twists and turns of the labyrinth. The program should also calculate and print the length of the shortest path.

You are provided with a 2D grid representing a maze, where:

- 'S' represents the starting point.
- 'E' represents the exit point.
- '0' represents an open path.
- '1' represents a wall.

Requirements

- The maze can be of arbitrary size, but the program should be able to handle mazes up to 10x10 cells.
- Ensure the program can handle mazes with multiple possible paths but still find the shortest one.
- If no path from 'S' to 'E' is possible, the program should print an appropriate message.

Sample:

```
maze = [  
    ['S', '0', '1', '0', '0'],  
    ['0', '1', '0', '1', '0'],  
    ['0', '0', '0', '0', '0'],  
    ['0', '1', '1', '1', '0'],  
    ['0', '0', '0', 'E', '0'],  
]
```

Output:
Shortest Length: 7