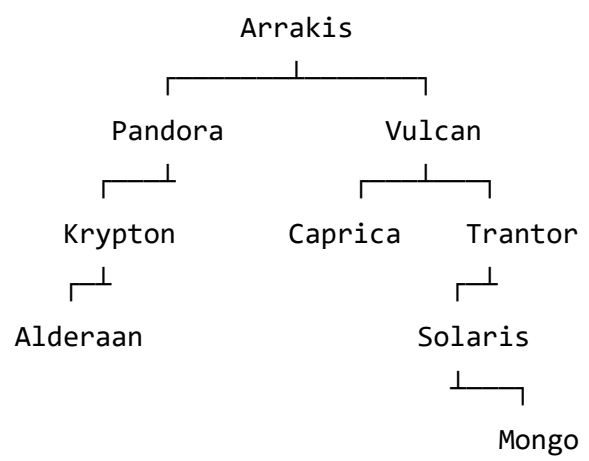## 30   Treetronomical Challenge
25 points

Introduction

As an interstellar gardener you are tasked with measuring the cosmic trees of the galaxy. These unique trees are binary, wherein each tree node is connected at most to two child nodes: the left child and right child. In this tree a node represents a planet and the connections between planets are branches that stretch across light-years. These branches which connect planets are a type of wormhole through which you can travel instantly. Your spaceship can jump from planet to planet using these wormholes. Each jump consumes one unit of fuel. Your mission is to calculate the cosmic diameter of these wondrous trees, which is the longest distance between any two planets connected to the tree. Since your spaceship has limited fuel, you need to find the cosmic diameter in advance to know how much fuel is needed to explore the far reaches of a given cosmic tree of the galaxy.

Here is an example of a cosmic tree (the same that is used in Example 3):

```
                          Arrakis
              ┌─────────────┴─────────────┐
           Pandora                      Vulcan
           ┌───┴                    ┌──────┴──────┐
         Krypton                 Caprica        Trantor
         ┌──┴                                    ┌──┴
       Alderaan                                Solaris
                                                 ┴────┐
                                                     Mongo
```

The root node for the tree is planet Arrakis. It has two child nodes: on the left the planet Pandora and on the right the planet Vulcan. Pandora is the root of a tree with just one planet at the left: Krypton. On the other hand, Vulcan has two child planet nodes: Caprica on the left and Trantor on the right. And so, it continues for the following planets on the tree.

> ⚡ The diameter of a binary tree is the length of the longest path between any two nodes in a tree. This path may or may not pass through the root.
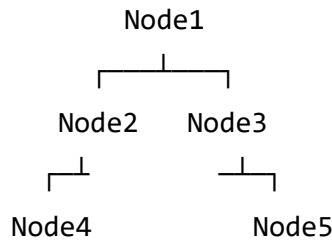
Can you write a program that calculates the cosmic diameter of these trees?

Input

A cosmic tree is represented using parentheses that follow the binary tree structure.

```
                    Node1
              ┌───────┴───────┐
            Node2           Node3
           ┌─┴┐              ┌─┴┐
         Node4            Node5
```

The notation "Node1(Node2,Node3)" represents a binary tree structure in a human-readable format. Here's how this notation can be interpreted: "Node1" represents the root node of the binary tree, "Node2" is the left child node and "Node3" is the right child node. In this notation, you can see that the tree structure is defined recursively. "Node2" and "Node3" can themselves be binary tree structures following the same notation, allowing for the representation of complex binary trees. So, this whole tree can be represented as Node1(Node2(Node4),Node3(,Node5)). Please notice that there are not any white space and that a single left node is noted as (Node4) while in case of a single right node a comma precedes the node (,Node5).

Output

The output is a positive integer with the cosmic diameter.

Example 1

Input

```
PlanetA(PlanetB(PlanetC))
```

Output

3

Example 2

Input

```
PlanetA(,PlanetB)
```

Output

2

Example 3

Input

```
Arrakis(Pandora(Krypton(Alderaan)),Vulcan(Caprica,Trantor(Solaris(,Mongo))))
```

Output

8