COMP9021 Principles of Programming
Term 1, 2024

Coding Quiz 3

Worth 4 marks and due Week 5 Thursday @ 9pm

Description

You are provided with a **stub** in which you need to **insert your code where indicated without doing any changes to the existing code** to complete the task.

The current code prompts the user for an **arity** (a natural number) and a **word**. Your task is to complete the function `is_valid(word, arity)` that checks if the provided `word` with the given `arity` will return either **True** if the word is valid or **False** if the word is invalid based on the constraints below.

Let's call a **symbol** a **word** consisting of nothing but **alphabetic characters** and **underscores**.

The function checks if the **word** is valid, that is, it satisfies the following **inductive** definition:

- a **symbol**, with **spaces** allowed at both ends, is a **valid word.**
- a **word** of the form **s(w_1, ..., w_n)** with **s** denoting a **symbol** and **w_1, ..., w_n** denoting **valid words**, with **spaces allowed at both ends and around parentheses and commas**, is a **valid word**.

See the test cases below for more details.

Due Date and Submission

Quiz 3 is due **Week 5 Thursday 14 March 2024 @ 9.00pm** (Sydney time).

Note that **late** submission with **5% penalty per day** is allowed **up to 3 days** from the due date, that is, any late submission after **Week 4 Sunday 17 March 2024 @ 9pm** will be discarded.

Make sure not to change the filename `quiz_3.py` while submitting by clicking on **[Mark]** button in **Ed**. It is your responsibility to check that your submission did go through properly using **Submissions** link in Ed otherwise your mark will be **zero** for Quiz 3.

Test Cases

```
$ python3 quiz_3.py
Input an arity : 0
Input a word: f_1
The word is invalid.
```

```
$ python3 quiz_3.py
Input an arity : 0
Input a word: ()
The word is invalid.
```

```
$ python3 quiz_3.py
Input an arity : 0
Input a word: function_of_arity_one(hello)
The word is invalid.
```

```
$ python3 quiz_3.py
Input an arity : 1
Input a word: f)
The word is invalid.
```

```
$ python3 quiz_3.py
Input an arity : 1
Input a word: f[a]
The word is invalid.
```

```
$ python3 quiz_3.py
Input an arity : 2
Input a word: f(a, g(b))
The word is invalid.
```

$ python3 quiz_3.py
Input an arity : 3
Input a word: constant
The word is invalid.

$ python3 quiz_3.py
Input an arity : 3
Input a word: f((a,b,c))
The word is invalid.

$ python3 quiz_3.py
Input an arity : 3
Input a word: f(g(a,a), f(a,b))
The word is invalid.

$ python3 quiz_3.py
Input an arity : 3
Input a word: f(g(a,b,c),g(a,b,c),g(a,b,c)
The word is invalid.

$ python3 quiz_3.py
Input an arity : 3
Input a word: f(a, g(a, b, f(a,b,c)), b, c)
The word is invalid.

$ python3 quiz_3.py
Input an arity : 0
Input a word: a
The word is valid.

```
$ python3 quiz_3.py
Input an arity : 1
Input a word: function_of_arity_one(hello)
The word is valid.
```

```
$ python3 quiz_3.py
Input an arity : 2
Input a word: F(g(a,a), f(a,b))
The word is valid.
```

```
$ python3 quiz_3.py
Input an arity : 3
Input a word: ff(ff(ff(a,b,ff(aa,bb,cc))  ,  b ,  ff(a,b,c))  ,  b  ,  ff(a,ff(a,b,c),c))
The word is valid.
```

```
$ python3 quiz_3.py
Input an arity : 4
Input a word: f(a, FF(a, b, fff(a, b, c, FfFf(a,b,c,d)), FfFf(a,b,c,d)), c, d)
The word is valid.
```

Some More Test Cases

Here are some more examples that may help clarify doubts about Quiz 3 requirements:

```
Input an arity : 0
Input a word: f()
The word is invalid.
```

```
Input an arity : 1
Input a word: f()
The word is invalid.
```

```
Input an arity : 0
Input a word: f
The word is valid.
```

```
Input an arity : 1
Input a word: f(x)
The word is valid.
```

```
Input an arity : 0
Input a word: _
The word is valid
```

```
Input an arity : 2
Input a word: f ( a  ,  _ )
The word is valid.
```

```
Input an arity : 2
Input a word: f ( f ,  )
The word is invalid.
```

```
Input an arity : 2
Input a word: f ( f , a  )
The word is valid.
```

```
Input an arity : 1
Input a word: f    (f)
The word is valid.


Input an arity : 0
Input a word: f. f
The word is invalid.
```