Lab 07 - Trees as list of lists

Before you come to the lab

1. Read this document carefully to properly prepare for the lab and turn in your lab solution.
2. Study Section 6.4 of the textbook
3. Study how to create unit tests in Python https://realpython.com/python-testing/ (https://realpython.com/python-testing/)

Exercise

1) Create the following folder for your lab07:

```
lab07/
|
├── eval/
|   └── __init__.py
└── test.py
```

- `__init__.py` should contain the Python code you have developed as part of the solution for this lab assignment.
- `test.py` will contain your test cases.

2) Implement a function called `evalTree` that takes two arguments: a *tree* and an *environment*, where:

- *tree* (in list of lists notation) represents a *simp* expression. *simp* expressions are defined as follows:
  - integer numbers and python identifiers (valid names for variables) are *simp* expressions;
  - if s is a *simp* expression, then (s) is also a *simp* expression;
  - if a and b are *simp* expressions, then the following are *simp* expressions: $a + b$, $a - b$, $a * b$, and a/b.
- the *environment* is a list of bindings $[[id_1, val_1], [id_2, val_2], \cdots]$, representing that identifier id_i is bound to integer number val_i.

  Your function `evalTree(tree, environment)` should evaluate the expression represented by the `tree`, taking into account the bindings defined in the `environment`.

The table below shows examples of trees, their respective *simp* expression, an environment, and the value `evalTree` should return when given the tree and the respective environment.

Tree	Expression	Enviroment	Value
`["10", [], []]`	10	`[["a", 10], ["b", 20], ["c", 30]]`	10
`["x1", [], []]`	$x1$	`[["a", 10], ["x1", 22]]`	22
`["x1", [], []]`	$(x1)$	`[["a", 10], ["x1", 22]]`	22
`["/", ["a", [], []], ["0", [], []]]`	$a/0$	`[["a", 10], ["x1", 22]]`	None
`["*", ["b", [], []], ["c", [], []]]`	$b * c$	`[["a", 10], ["b", 20], ["c", 30]]`	600
`["+", ["a", [], []], ["*", ["b", [], []], ["c", [], []]]]`	$a + b * c$	`[["a", 10], ["b", 20], ["c", 30]]`	610
`["+", ["a", [], []], ["*", ["b", [], []], ["c", [], []]]]`	$a + b * c$	`[["b", 20], ["c", 30]]`	None

3) Prepare test cases for your `evalTree` function (with trees and environments different from the ones mentioned above).

Preparing to submit your report

1. Ensure you have structured your `lab07` folder as indicated above.
2. Ensure you have properly created your unit tests in `test.py` in your `lab07` folder.
3. Create a zip file of your `lab07` folder.

What to submit

At the Lab web page in D2L, click on `Lab Solution Submission`, then attach and submit **only the zip** file you have created as per the instructions above.