hw1

Reading

Chapters 1 and 2.

Instructions

1. Download and open the file hw1.py. (IDLE > File Open > ...navigate to and select hw1.py ...)
2. Fill out the comment section at the top of your file (name, collaborators, and references)
3. For each exercise, paste your solution into the file hw1.py. (see Worked Example below)
4. Submit your hw1.py through d2l.

Exercises

For each exercise, write a *single* expression/statement that refers to the specified variables. (You should test them by assigning actual values to those variables and then writing expressions that refer to those variables until you get the correct answer. See the next section for an example. For problems 3 and greater *you* will need to choose appropriate values for the variables). Most problems are adapted from Perkovic's *Introduction to Computing Using Python (2nd Edition)*.

1. Suppose that we have assigned `s1 = '-'` and `s2 = '+'`. Write an expression that refers to the variables `s1` and `s2` and that evaluates to `'---+++++'`.
2. Suppose that we have assigned `s1 = '-'` and `s2 = '+'`. Write an expression that refers to the variables `s1` and `s2` and that evaluates to `'--+++--+++--+++--+++--+++'`.
3. The variable `side` contains the length of a side of a cube. Write an expression that returns the *volume* of the cube.
4. The variables `length` and `width` refer the dimensions of a rectangle. Write an expression that results in a value of `True` if and only if the rectangle has **area** 100 or more.
5. The variables `days` holds an integer value. Write an expression that compute the number of *complete* weeks spanned by that number of days. For example if `days = 27`, then the expression would evaluate to the integer `3` (not quite 4 because that would require 28 days).
6. Assume that the variable `n` refers to an integer. Write an expression that returns `True` if and only if `n` is divisible by either 2 or 5.
7. Suppose that the variable `s` refers to a string. e.g., `s='peach'` or `s='watermelons'`. Write an expression that revaluates to `True` if and only if the 1st character of `s` is `'w'`
8. Suppose that the variable `s` refers to a string. e.g., `s='peach'` or `s='watermelons'`. Write an expression that revaluates to `True` if and only if the last character of `s` is `'s'`
9. Suppose that the variable `s` refers to a string with *odd* length, e.g., `s='peach'` or `s='watermelons'`. Write an expression that revaluates to `True` if and only if the *middle* character of `s` is `'a'`

10. Suppose that the variables `word1` and `word2` refer to words (strings). Write an expression that returns `True` if and only if `word1` has exactly one more character than `word2`. (I.e., this would be `True` for `word1 = 'apple'` and `word2 = 'pear'` but `False` if they are switched).
11. Assume that `numbers` refers to a list of numbers, for example `[2,3.5,1,-7,8.2]` or `[3,3.0,3.00,3.000]`, or `[3,3.0,3.0,3.001]`. Write an expression that computes to `True` if and only if all the numbers in `numbers` have the same value. Hint: use `min` and `max`.
12. Assume that the variable `fruit` refers to a list containing the names (strings) of different kinds of fruit. Write an expression that evaluates to `True` if and only if `'pear'` occurs in the list `fruit`.
13. Write an expression that produces a *list* that contains the first three items from `fruit`.
14. Write an expression that produces the *last* item from `fruit`.
15. Write an expression that produces a *list* that contains the first three items *and* the last item from `fruit`.
16. Suppose that `flips` is a *list* containing strings, each either `'H'` or `'T'`, for example., `flips = ['H', 'H', 'H', 'H', 'H', 'T', 'T', 'H', 'T', 'H']`. Write an expression that computes the number of `'H'`'s that occur in the list `flips`.
17. Write an expression that computes the percent of `flips` that are `'H'`. The returned valued should be a decimal between 0.0 (none) and 1.0 (all). For the `flips` above the result should be 0.7.
18. Write an expression that evaluates the location of the first occurrence of `'T'` in the list `flips`.
19. Suppose that the string `s` refers to a string with length 3. Write an expression that returns a string with the characters from `s` in *reverse order*. (So, if `s='hat'` then the expression would evaluate to `'tah'`)
20. Consider a dartboard (a circle) in the plane that is centered at (0,0) and that has radius 10. The variables `x` and `y` represent a dart that is thrown and hits the location `(x,y)`. Write an expression that returns `True` if and only if the dart hits the dartboard (or its edge). (If you use any outside references , cite the source(s) in a comment at the top of your hw1.py file.)

Worked Example

As an example we will work the first problem. In IDLE, we define variables and develop the expression:

```
1 >>> s1 = '-'
2 >>> s2=  '+'
3 >>> 2*s1 + 4*s2 # wrong answer
4 '--++++'
5 >>> 3*s1 + 5*s2
6 '---+++++'
```

Note that an error was made along the way. When you have the right expression, copy and paste **only** the line containing the correct expression (line 5) into the hw1.py file. Include the `>>>` at the start of the line. **Do not include any** your other lines, variable assignments (lines 1 and 2), mistakes (lines 3 and 4), or the output of any of your expressions (lines 4 and 6). Now, hw1.py will now include:

```
1 ## 1 ##
2 >>> 3*s1 + 5*s2
3 ## 2 ##
4 ...
```

For most exercises you will need to pick values for the variables. Make sure you pick values that make sense for the problem. And, for each problem your solution should be **only** a single expression (a single line) in your hw1.py.

Eric Sedgwick - 2020-07-1