

Lab 09 - Tuples and Dictionaries

Background

Python has a wide variety of built-in data types for storing numbers and text that we have already worked with (int, float, string). There are also common data structures that store values in a more complex way (list, tuple, dictionary). Today we will be focusing on tuples and dictionaries.

Content Learning Objectives

- Know how to create and use a tuple
- Explain what a tuple is in Python
- Know how to create and use a dictionary
- Explain what a dictionary is in Python

Part 1: Sequences

Lists, Strings, and Tuples are examples of **sequence** types in Python. Enter the Python code into a Python shell to complete the table below.

Python Code	Shell Output
seq1 = "one two"	
type(seq1)	
len(seq1)	
seq1[1]	
seq1[1] = '1'	
seq2 = "one", "two"	
type(seq2)	
len(seq2)	
seq2[1]	
seq2[1] = "1"	

```
seq3 = ("one", 2, "three")
```

```
type(seq3)
```

```
len(seq3)
```

```
seq3[2] = 3
```

```
seq4 = ["one", 2, "three"]
```

```
type(seq4)
```

```
seq4[2]
```

```
seq4[2] = 3
```

```
print(seq4)
```

```
number = 12345
```

```
type(number)
```

```
number[3]
```

Questions

1. What data types did we work with?

In []:

2. There are two different syntax patterns you can create a tuple. What are they?

In []:

3. How does the syntax of creating a tuple compare to the syntax of creating a list?

In []:

4. Which sequence types allow for elements to be changed? Which do not?

In []:

5. Is it possible to store values of different types in a sequence? If so, give an example from the table. If not, explain how you know.

In []:

6. There is one BIG difference between the functionality of tuples and lists.
What is it?

In []:

Tuples are particularly useful in functions when you want to return multiple values in one variable. While useful, you will likely not work with them directly on a regular basis but you may see them in some function calls later in your education.

Part 2: Dictionaries

In Python, a **dictionary** stores "key:value" pairs. For each key, there is one value associated with it. This value could be anything: int, float, string, list, or even another dictionary. A key and its associated value are separated by colons while different key:value pairs are separated by commas all enclosed in curly braces. For example:

```
elements = {'C' : 'Carbon', "H": "hydrogen", "O" : "Oxygen", 'N' : "nitrogen"}
```

Key	Value
'C'	'Carbon'
"H"	"hydrogen"
"O"	"Oxygen"
'N'	"nitrogen"

Unlike a string, list or tuple that is a sequence type, a dictionary is a mapping type. This means that the values are referenced by a key rather than an index.

Type the following Python code into a shell to complete the table. Before you start, type the following line into your shell or run the line in your jupyter notebook.

```
In [28]: activeWx = {'RA' : 'Rain', 'DZ': 'Drizzle',  
                   'IC' : 'Ice Crystals', 'SN': 'Snow',  
                   'GR': 'Hail'}
```

Python Code	Shell Output
<code>type(activeWx)</code>	
<code>activeWx.keys()</code>	
<code>activeWx.values()</code>	
<code>activeWx.items()</code>	
<code>activeWx['RA']</code>	
<code>weather = 'SN'</code>	
<code>activeWx[weather]</code>	
<code>activeWx[SN]</code>	
<code>activeWx['Snow']</code>	
<code>activeWx[1]</code>	
<code>len(activeWx)</code>	
<code>activeWx['PL'] = 'Ice Pellets'</code>	
<code>activeWx.items()</code>	
<code>len(activeWx)</code>	

Questions

7. List all of the keys stored in the activeWx dictionary after completing the table.

In []:

8. What is the data type of the keys in the elements dictionary?

In []:

9. Explain why you got an error when you ran each of the following lines:

- a) `activeWx[SN]`
- b) `activeWx['Snow']`
- c) `activeWx[1]`

In []:

10. Write a python expression that creates a dictionary named `cloud_cover`. The dictionary should have keys that are cloud cover abbreviations (SKC, FEW, SCT, BKN, OVC) and values that are the associated meaning (Skies Clear, Few, Scattered, Broken, Overcast)

In []:

11. If you assign two different values to the same key, which of the values is stored in the dictionary? Justify your answer with an example.

In []:

12. Another way you could store data is with two lists:

```
keys = ['RA', 'DZ', 'IC', 'SN', 'GR']
```

```
values = ['Rain', 'Drizzle', 'Ice Crystals', 'Snow', 'Hail']
```

What is a disadvantage of this approach? Explain your reasoning.

In []:

Part 3: Dictionary Practice

For this part use the dictionary below to complete the functions and answer the questions.

```
In [29]: sept_temps = {'09-01': 57.0, '09-02': 53.51, '09-03': 51.66,
                      '09-04': 43.11, '09-05': 41.51, '09-06': 39.03,
                      '09-07': 35.44, '09-08': 43.74, '09-09': 39.41,
                      '09-10': 45.87, '09-11': 45.18, '09-12': 44.87,
                      '09-13': 34.36, '09-14': 27.53, '09-15': 29.53,
                      '09-16': 38.77, '09-17': 39.15, '09-18': 40.29,
                      '09-19': 40.9, '09-20': 28.04, '09-21': 24.62,
                      '09-22': 32.32, '09-23': 27.94, '09-24': 38.26,
                      '09-25': 35.4, '09-26': 41.47, '09-27': 38.63,
                      '09-28': 32.29, '09-29': 34.45, '09-30': 33.32}

oct_temps = {"10-01": 31.1, "10-02": 31.1, "10-03": 32.2, "10-04": 25.0,
             "10-05": 15.0, "10-06": 14.4, "10-07": 12.2, "10-08": 19.4,
             "10-09": 22.2, "10-10": 19.4, "10-11": 21.7, "10-12": 20.0,
             "10-13": 11.7, "10-14": 7.2, "10-15": 11.1, "10-16": 18.3,
             "10-17": 14.4, "10-18": 13.9, "10-19": 15.0, "10-20": 10.0,
             "10-21": 8.3, "10-22": 7.2, "10-23": 10.0, "10-24": 13.9,
             "10-25": 16.1, "10-26": 20.0, "10-27": 15.0, "10-28": 11.1,
             "10-29": 10.0, "10-30": 8.9, "10-31": 6.7}
```

```
In [30]: def warmest_day(dictionary):  
        #loop through each day in the dictionary  
        #test to see if it is the warmest  
        #save the warmest day  
  
        return date  
  
#call the function here
```

13. Which day in September was the warmest? How about October?

In []:

```
In [31]: def coolest_day (dictionary):  
        #very similar to warmest_day but opposite  
  
        return date  
  
#call function here
```

14. Which day in September was the coolest? How about October?

In []:

```
In [32]: def average_temp(dictionary):  
        #loop through each day in the dictionary  
        #add the temperatures together  
        #find the length of the dictionary  
        #divide total by length  
  
        return temp
```

```
#call function here
```

15. What are the average temperatures of each month? Which month had a warmer average?

In []:

```
In [33]: def days_above_temp(dictionary, temp_limit):  
         #loop through each day in dictionary  
         #test to see if day is above, below, or equal to the temp_limit  
         #add day if it meets criteria  
  
         return num_of_days  
  
         #call function here
```

16. How many days are above freezing in September? How about October?

In []: