Dictionary

Quick Dictionary Exercise

Code

```
a = (("A",2), ("B",3), (1,4))
dict_a = dict(a)
print(dict_a)

b = [[1,"A"], [(2,3),4]]
dict_b = dict(b)
print(dict_b)
```

Output

Quick Dictionary Exercise

Code

```
a = ((“A”,2), (“B”,3), (1,4))
dict_a = dict(a)
print(dict_a)

b = [[1,“A”], [(2,3),4]]
dict_b = dict(b)
print(dict_b)
```

Output

```
{“A”: 2, “B”: 3, 1: 4}

{1: “A”, (2, 3): 4}
```

Quick Dictionary Exercise

Code

```
a = (("A",2), ("B",3), (1,4))
dict_a = dict(a)
print(dict_a)
print(dict_a[2])
b = [[1,"A"], [(2,3),4]]
dict_b = dict(b)
print(dict_b)
print(dict_b[(2,3)])
```

Output

```
{"A": 2, "B": 3, 1: 4}


{1: "A", (2, 3): 4}
4
```

Quick Dictionary Exercise

Code

```
a = (("A",2), ("B",3), (1,4))
dict_a = dict(a)
print(dict_a)
print(dict_a[2])
b = [[1,"A"], [(2,3),4]]
dict_b = dict(b)
print(dict_b)
print(dict_b[(2,3)])
```

Output

```
{"A": 2, "B": 3, 1: 4}
KeyError
{1: "A", (2, 3): 4}
4
```

Quick Dictionary Exercise

Code

```
for key in dict_b.keys():
    print(key)

for val in dict_b.values():
    print(val)
```

Output

Quick Dictionary Exercise

Code

```
for key in dict_b.keys():
    print(key)

for val in dict_b.values():
    print(val)
```

Output

```
1
(2, 3)
A
4
```

Quick Dictionary Exercise

Code

```
for k,v in dict_b.items():
    print(k, v)



del dict_b[(2, 3)]
print(dict_b)
del dict_b[2]
print(dict_b)
```

Output

Quick Dictionary Exercise

Code

```
for k,v in dict_b.items():
    print(k, v)
```

Output

```
1 A
(2, 3) 4
```

```
del dict_b[(2, 3)]
print(dict_b)
```

```
{1: “A”}
```

```
del dict_b[2]
```

```
KeyError
```

```
print(dict_b)
```

```
{1: “A”}
```

Quick Dictionary Exercise

Code

```
print(tuple(dict_a.keys()))
print(list(dict_a.values()))

dict_c = {1: {2: 3}, 4: 5}
print(dict_c)
```

Output

Quick Dictionary Exercise

Code	**Output**
`print(tuple(dict_a.keys()))`	`(“A”, “B”, 1)`
`print(list(dict_a.values()))`	`[2, 3, 4]`
`dict_c = {1: {2: 3}, 4: 5}`	
`print(dict_c)`	`{1: {2: 3}, 4: 5}`

Dictionary Values are Mutable
But NOT for Keys

Code

```
d = {1:[2,3]}
print(d)
d[1][0] = 9
print(d)
d = {(1,2):'a'}
d = {[1,2]:'a'}
```

Output

```
{1: [2, 3]}

{1: [9, 3]}
```

Dictionary Values are Mutable
But NOT for Keys

Code

```
d = {1:[2,3]}
print(d)
d[1][0] = 9
print(d)
d = {(1,2):'a'}
d = {[1,2]:'a'}
```

Output

```
{1: [2, 3]}

{1: [9, 3]}
# No problem
Error!
```

Quick Dictionary Exercise

```
dict_c = {1: {2: 3}, 4: 5}
```

Code	**Output**
`dict_d = dict_c.copy()`	
`dict_d[4] = 9`	
`dict_d[1][2] = 9`	
`print(dict_c)`	`{1: {2: 9}, 4: 5}`
`del dict_c`	
`print(dict_c)`	

Quick Dictionary Exercise

```
dict_c = {1: {2: 3}, 4: 5}
```

Code	**Output**
`dict_d = dict_c.copy()`	
`dict_d[4] = 9`	
`dict_d[1][2] = 9`	
`print(dict_c)`	`{1: {2: 9}, 4: 5}`
`del dict_c`	
`print(dict_c)`	`NameError`

Dictionary

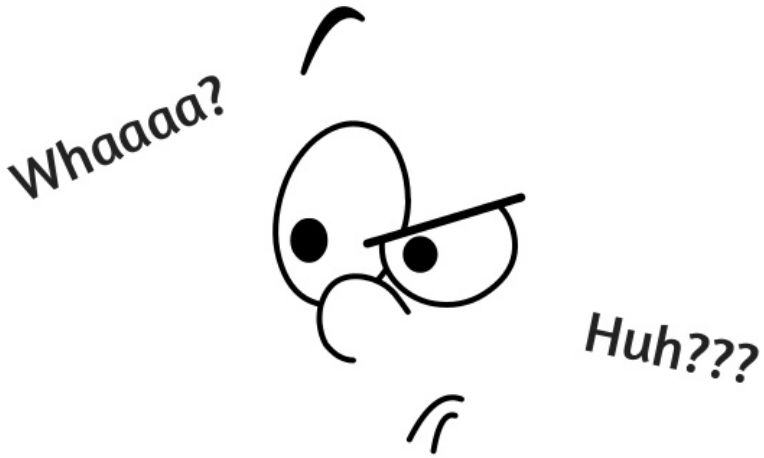
- Creation
  - Empty dictionary `{}`
  - Initialized dictionary `{key1: elem1, key2: elem2, ... }`
  - From tuple/list `dict(sequence_of_pairs)`
    - The element in tuple/list must be a pair
    - The first of the pair will be the key
    - The second of the pair will be the value
- Access
  - `dict_a[key]`
- Assignment
  - `dict_a[key] = value`

A lot of students made BIG mistakes of NOT using it

What Students Did

```
d = {‘a’:1, ‘b’:2, ‘c’:’haha’,(1,2):’x’}
# What to access d[‘b’]
for i in d.keys():
  if i == ‘b’:
      print(d[i])
```

```
# simply
print(d[‘b’])
```



Dictionary

- Deletion
  - `del dict_a[key]` deletes the record corresponding to the specified key in the dictionary `dict_a`, if exists
  - `dict_a.clear()` removes all entries in dictionary `dict_a`
  - `del dict_a` deletes the dictionary

- Note the differences between all three

Dictionary

- Operations
  - `dict_a.get(key, default=None)` returns `dict_a[key]` if exists or default value otherwise
  - `key in dict_a` returns `True` if key in `dict_a`
  - `dict_a.keys()` returns list of `dict_a` keys
  - `dict_a.values()` returns list of `dict_a` values
  - `dict_a.items()` returns list of `dict_a` (key,value)
  - `len(dict_a)` returns number of elements

Dictionary Exercise

- Anagram
  - An anagram is a word or a phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once
  - Example:
    - “nag a ram” is an anagram for “anagram”
    - “eleven plus two” is an anagram for “twelve plus one”
  - Write a function `is_anagram(word1, word2)` that returns `True` if the two words are anagram of one another, otherwise returns `False`

By using Dictionary

Dictionary Exercise

- T9
  - Old mobile phone only has numerical keypads where every letter is associated with a number as shown on the right (0 is space)
  - T9 is a predictive text technology for mobile phone
  - We can represent the keypad in two different ways
    - A list such that each element is a string of characters associated with the number which is the element's index which gives us
      `[" ", "", "abc", "def", "ghi", "jkl", "mno", "pqrs", "tuv", "wxyz"]`
    - A dictionary where the keys are the characters and the values are the associated number which gives us
      `{"a": 2, "b": 2, ..., "z": 9, " ": 0}`

Dictionary Exercise

- T9
  - Suppose there are other alphabets and other symbols for larger numbers
  - Write a function `to_dict(keyL)` which take in the keys as the list representation and returns the dictionary representation
  - Write a function `to_list(keyD)` which take in the keys as the dictionary representation and returns the list representation

Dictionary Exercise

- T9
  - Write a function `to_nums(word)` that takes an input string and returns an integer representing the numbers to be pressed to input the string using T9
    - You may assume that both `keyL` and `keyD` are already initialized
    - Example: `to_nums("i luv u")` returns `4058808`
  - Write a function `to_letters(num)` that takes in a number and returns a list of all combinations of letters that can be represented by the numbers on a keypad in any order
    - You may assume that both `keyL` and `keyD` are already initialized