Data Structures COMS 261

Python has four built in "container types" for storing collections of values.

	Ordered?	Mutable?	Duplicates?
Lists	Yes	Yes	Allowed
Tuples	Yes	No	Allowed
Dictionaries	By insertion order	Yes	Keys must be unique
Sets	No	Yes	Not allowed

1. Suppose `t = (4, 5, 6)`. For each command below, say whether it works or gives an error. If it works, say what it does.

   (a) `t[0] = 7`

   (b) `t.append(7)`

   (c) `t = t + (7,)`

   (d) `print(t[1:])`

2. What is the type of each of the following? Use `type()` to check.

   (a) `a = ([4.0])` (b) `b = "test",` (c) `c = "this,"` (d) `d = ()`

3. What will this code print? The loop uses the `items` method, which gives you each key and value as a tuple.

```
prices = {"apple": 3, "pear": 2, "plum": 5}
total = 0
for fruit, cost in prices.items():
    if cost > 2:
        print(fruit)
    total += cost
print(total)
```

4. What is the value of `list(enumerate("test"))`?

5. What are the values of these expressions?

   (a) `set("mississippi")`

   (b) `set([3, 1, 3, 2, 1])`

   (c) Python treats `{}` as an empty *dictionary*. How can you create an empty set?

   (d) Write a one-line expression that uses a set to count how many different words are in a list called `words`.

6. Let `A = {1, 2, 3, 4}` and `B = {3, 4, 5}`. Find each result.

   (a) `A | B` (b) `A & B` (c) `A - B`

7. For each situation below, which data structure would you choose (list, tuple, dictionary, or set)? Why?

   (a) The coordinates (latitude and longitude) of a location.

   (b) The students at a school, so you can quickly check whether a name is registered.

   (c) Each student's name along with their final grade.

8. Let `pairs = [("a", 1), ("b", 2), ("a", 3)]` where each pair in the list is a tuple with a letter and a number.

   (a) What is `dict(pairs)`?

   (b) Make a list comprehension that returns a list of the pairs with a letter `"a"`.

   (c) Write a one-line Python expression that adds up the numbers in all of the pairs. Hint: Use the `sum` function with a list comprehension.