Chapter 11 - Data Collections

From Section 11.8 in *Python Programming: An Introduction to Computer Science*:

1. True/False: 1-10

   Problem 1: The median is the average of a set of data
   
   Solution
   False
   The average of a set is often referred to as the arithmetic mean. The median refers to the most middle value.

   Problem 2: Standard deviation measure how spread out a data set is.
   
   Solution
   True

   Problem 3: Arrays are usually heterogeneous but lists are homogeneous.
   
   Solution
   False
   Lists in Python are heterogeneous, which means they can hold multiple types of values at once.

   Problem 4: A python list cannot grow or shrink in size
   
   Solution
   False
   This is often true in other languages. In Python, lists are dynamic and grow and shrink as needed.

   Problem 5: Unlike strings, Python lists are not mutable.
   
   Solution
   False
   It’s actually the opposite. In Python, strings are immutable and lists are mutable. This means that to modify a string, Python actually creates a whole new string whereas lists can be modified in place piece by piece.

   Problem 6: A list must contain at least one item
   
   Solution
   False
   [] is an empty list and is perfectly legal.

   Problem 7: Items can be removed from a list with the del operator
   
   Solution
   True
   True, for example, calling del l[1] will remove the second element of a list called l.

   Problem 8: A comparison function returns either True or False.
   
   Solution
   False
   A comparison function should return a numeric value that will then be used to sort the items.

   Problem 9: A tuple is similar to an immutable list
   
   Solution
   True
   Tuples are immutable and have many of the same operations as lists.
Problem 10: A Python dictionary is a type of sequence
Solution
False
Dictionaries are key-value stores, not any type of list.

2. Multiple Choice: 2-6, 9

Problem 1: Where mathematicians use subscripting, computer programmers use Solution
B.) indexing
A[0] == A0

Problem 2: Which of the following is not a built-in sequence operation in Python
Solution
D. Repetition
Repetition is achieved through other means like for loops.

Problem 3: The method that adds a single item to the end of a list is Solution
D.) Append
Hence the name, append.

Problem 4: Which of the following is not a Python list method Solution
C.) get
get is not a built in function

Problem 5: Which of the following is not a characteristic of a Python list?
Solution
D. It is immutable
Python lists are mutable, they can be modified in place.

Problem 6: Which of the following expressions correctly tests if x is even?
Solution
A. x
If the remainder of x/2 is 0, we know that x is even.

Problem 7: The parameter xbar in stdDev is what?
Solution
D.) mean
The arithmetic mean.

Problem 8: What keyword parameter is used to send a key-function to the sort method?
Solution
D.) key
Wonder why they would name it that?

Problem 9: Which of the following is not a dictionary method?
Solution
C. Sort
Dictionaries are unsorted collections.

Problem 10: The items dictionary method returns an
Solution
B. Sequence of tuples
items() returns tuples of the key-value pairs.
3. Discussion: 1, 2

4. Programming Exercises: 2, 3, 5(acd), 6, 8, 10, 16

Problem 1:

Solution
a. [2, 1, 4, 3, c, a, b]
b. [2, 1, 4, 3, 2, 1, 4, 3, 2, 1, 4, 3, c, a, b, c, a, b]
c. 1
d. [1,4]
e. TypeError: can only concatenate list (not str) to list

Problem 2:

Solution
a. s1 = [1,4,3]
b. s1 = [1,2,3,4]
c. s1 = [2,1,4,3,2]
d. s1 = [2,1,3]
e. s2 = [c, a, d, b]