15-110 - Quiz3 - 10/20/2021

Name: _____   andrewID: _____

- This quiz tests material from weeks 1-6 of the course (primarily weeks 5-6).
- You have **20 minutes** to take the quiz.
- If you have a clarification question, raise your hand and a proctor will come help you.
- You must complete the quiz **individually**. You may refer to paper notes during the quiz, but do not communicate with anyone else.

1. Recursion and Lists - Code Writing [40pts]

Write the function `recProduct(lst)` that takes a list of integers and **recursively** calculates the product of those integers (the result of multiplying them all together), returning the result. However, the function should *only* multiply the non-zero integers, to avoid setting the whole result to 0. In other words, all 0s should be ignored. (You are guaranteed there will be at least one non-zero integer in the list.)

Example: `recProduct([4, 2, 1, 0, 6])` should return 48, as `4*2*1*6 = 48`.

Important: to get full credit on this problem, you **must use recursion**. Any use of loops or other non-recursive solutions will result in half credit at maximum.

Hint: what's the base case for this problem? How can you make the problem smaller?

```
def recProduct(lst):
        if len(lst) == 0:
                return 1
        elif lst[0] != 0:
                return lst[0] * recProduct(lst[1:])
        else:
                return recProduct(lst[1:])
```

2. Search Algorithms - Free Response [24pts]

Consider the list with the following elements:

5	13	26	45	55	61	78	81	92	95

For each of the following algorithms, if the algorithm is called on the list shown above and the given target number, which list values will the algorithm compare to the target number before returning? Write the values in the order they will be visited.

Linear Search, search for **26**	5, 13, 26
Binary Search, search for **92**	61, 92
Binary Search, search for **58**	61, 26, 55

3. Dictionaries - Short Answer [16pts]

Given the following variable assignment, what will these expressions evaluate to?

```
d = { "apples" : 5, "pears" : 4 }
```

`d["apples"]`	5
`d[4]`	Key Error (or just error)

If we add a line of code directly after the variable assignment:

```
d["pears"] = 7
```

What will the dictionary d evaluate to?

{"apples":5, "pears":7}

4. References and Memory - Short Answer [20pts]

At the end of this set of operations, what list value will each variable hold? Select from the options below.

```
x = [ "15110", "Fall" ]
z = [ "15110", "Fall" ]
y = x
x.append("CMU")
y = y + [ "Quiz3" ]
z.append("CMU")
y.pop(0)
```

x will hold:
- ☐ ["15110", "Fall", "CMU", "Quiz3"]
- ☐ ["15110", "Fall", "CMU", "CMU"]
- ☐ **["15110", "Fall", "CMU"]**
- ☐ ["Fall", "CMU", "Quiz3", "CMU"]
- ☐ ["Fall", "CMU", "Quiz3"]

y will hold:
- ☐ ["15110", "Fall", "CMU", "Quiz3"]
- ☐ ["15110", "Fall", "CMU", "CMU"]
- ☐ ["15110", "Fall", "CMU"]
- ☐ ["Fall", "CMU", "Quiz3", "CMU"]
- ☐ **["Fall", "CMU", "Quiz3"]**

z will hold:
- ☐ ["15110", "Fall", "CMU", "Quiz3"]
- ☐ ["15110", "Fall", "CMU", "CMU"]
- ☐ **["15110", "Fall", "CMU"]**
- ☐ ["Fall", "CMU", "Quiz3", "CMU"]
- ☐ ["Fall", "CMU", "Quiz3"]

Which of the variables will be aliases at the end of the code? **Select all that apply**.
- ☐ x and y
- ☐ x and z
- ☐ y and z
- ☐ **There are no aliases at the end of the code.**