Critical Thinking Questions:

Learning Objectives
Students will be able to:

Content:
- Explain how to send a list as an argument to a function
- Explain the purpose of the following functions: isalpha(),.isdigit(), isspace(), upper(), lower()
- Explain what is meant by the statement: “Strings are immutable.”
- Demonstrate the use of slicing with strings and lists.

Process:
- Write code that uses the following functions: isalpha(), isdigit(), isspace(),
- Write code that uses slicing to access elements of a list

Prior Knowledge
- Python concepts from Activities 1-16

1. Examine the following program. It includes a function that takes a list as an argument. Enter and execute the code:

```python
import random

def orderList(newList):
    newList.sort()
    newList.reverse()
    return newList

myList = []

for y in range(100):
    myList.append(random.randint(1,100))
print(orderList(myList))
```

a. What is the name of the function defined in this program? __________________________

b. What does the function do? __________________________

2. Enter and execute the following code.

```python
userInput = input("Enter a string that contains only letters: ")
if userInput.isalpha():
    print("Your string is valid.")
else:
    print("Your string does not contain all letters.")
```
a. Execute the program with at least five different types of input that include just letters, just numbers, letters, numbers and other characters. Examine the output for each input. What does the program do?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

b. What does the `isalpha()` function do? ____________________________

3. Enter and execute the following code.

```python
numString = input("Enter a number: ")
if numString.isdigit():
    num = int(numString)
    print(num, "to the fourth power is", num**4)
else:
    print("Your input is not a valid number.")
    print("Program terminated!")
```

a. Execute the program with at least five different types of input. Examine the output for each input. What does the program do?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

b. What does the `isdigit()` function do? ____________________________

4. Enter and execute the following code.

```python
sentence = "This is a sentence with some spaces."
numSpaces=0
for index in range(len(sentence)):
    if sentence[index].isspace():
        numSpaces += 1
print("Here is the sentence: ", sentence)
print("There are", numSpaces, "spaces in the sentence."
```

a. What does the program do? ____________________________

b. What does the `isspace()` function do? ____________________________

5. Enter and execute the following code:

```python
username = input("Enter user name: ")
if username.upper() == "CSCI134":
    print("Correct!")
else:
    print("Invalid user name.")
```
a. Execute the program with the following input and examine the corresponding output.
   • Csci134                                _______________________________________________________
   • Csci134                                _______________________________________________________
   • CSCI376                                 _______________________________________________________
   • CSCI1134                                _______________________________________________________

b. What does the upper() function do? _________________________________________________

c. Use the lower() function instead of the upper() function in the program above. Revise
   the line of code so that it still produces the same output. Execute the program again with the
   data listed in ‘a’. (Write the revised code below.)
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

6. Examine the following code:
   ```python
   word = "hat"
   print(word)
   word[0] = 'c'
   print(word)
   ```

   a. What do you think the program prints? ____________________________________________
   
   b. Enter and execute the code. Does the program do what you thought it did?
      _____________________________________________________________
   
   c. What would you think the code word[0] = 'c' should do? What does it actually do?
      _____________________________________________________________
   
6. Examine the following code:
   ```python
   word = "hat"
   print(word)
   word[0] = 'c'
   print(word)
   ```

   a. What do you think the program prints? ____________________________________________
   
   b. Enter and execute the code. Does the program do what you thought it did?
      _____________________________________________________________
   
   c. What would you think the code word[0] = 'c' should do? What does it actually do?
      _____________________________________________________________
   
   d. “Strings are immutable.” From the output you saw when you executed this program,
      what do you think this statement means?
      _____________________________________________________________

FYI: Slicing is a technique available in Python that allows you to access parts of lists or strings. You
can select multiple elements of a list or string.
Syntax: <listOrStringName>[indexOfFirstItem : indexAfterLastItem].

7. In this section we are going to try to access parts of a string using slicing. Enter and execute the
   following code. Examine the syntax of the code. It uses slicing to access parts of a string.
   ```python
   courseName = 'Introduction to Computer Science'
   print(courseName)
   print(courseName[0])
   print(courseName[-2])
   print(courseName[0:13])
   print(courseName[16:24])
   print(courseName[25:])
   ```
a. What is the output for each print statement in the program?

b. The first three print statements should be familiar. What does the fourth print statement do? Explain the meaning of [0:13].

c. What does the following print statement do? Explain the meaning of [16:27].

d. What does the following print statement do? Explain the meaning of [28:].

8. Finally, examine slicing using lists. Enter and execute the following program.

```python
import string
courselist = ['CSCI134', 'CSCI136', 'CSCI237', 'CSCI256']
print(courselist)
for course in courselist:
    print(course)
```

```
courseName = courselist[0:13]
print(courseName)
```

```
courseName = courselist[16:27]
print(courseName)
```

```
courseName = courselist[28:]
print(courseName)
```

```
courseName = courseName[1:3]
print(courseName)
```
b. Explain what the following code does.  

```
copyList = courseList[:]
```

---

c. Explain what the following code does:

```
copylist[1] = "CSCI334"
```

---

d. Are lists immutable? Explain your answer.

---

e. Explain what the following code does:

```
print(copyList[1:3])
```

---

**Application Questions: Use the Python Interpreter to check your work**

1. Create a list named “Days” that includes all the days of the week. Print the list.

---

2. Create a line of code that uses **slicing** to print the last three days in the list “Days” which you created in question 1.

---

3. Create a list named “Vowels” that includes the vowels ‘a’, ‘e’, ‘i’, ‘o’, ‘u’.

---

4. Use the code in question 3, and create a program that analyzes a user’s input. Complete the following steps:
   a. Create code that prompts the user for a vowel.

---

b. Create code to determine if the user input is a vowel. If so, congratulate them.

---

---

c. Create code that determines if it is a letter, but not a vowel and prints a message that indicates that.

---

---

d. Add code that determines if the user input is a digit instead of a letter, print a message that indicates that as well.
e. Otherwise, tell the user that their input was not a vowel, a letter, or a number.

f. Prevent the program from crashing by terminating the program if the user enters more than one character. This should actually be tested first.

g. Put all the code together and test the program with several sets of data. List a sample output.