Python Activity 14: Reading from Files

Learning Objectives
Students will be able to:

Content:

- Explain how to open a text file for reading
- Explain the difference between the read() and readline() functions
- Explain the purpose of the str() function.
- Explain the effect of the arguments of the range function when reading data from a file.
- Explain the purpose of the rstrip(), open(), and close() functions

Process:

- Write code that opens, writes to and closes a file
- Write code that opens, reads from and closes a file
- Write code that uses a nested FOR loop

Prior Knowledge

- Python concepts from Activities 1-12

Critical Thinking Questions:

**FYI:** In Python, you can access data from a text file as well as from the keyboard. You can create a text file in any text editing tool. You should only have one data item per line in the file.

1. Create a text file named `sports.txt` and enter the sports listed below, one word per line.

   Enter and execute the program. Be sure the saved program is in the same folder as the text file.

```python
def processSports():
    with open('sports.txt', 'r') as spList:
        sp = spList.read()
        print(sp)

if __name__ == '__main__':
    processSports()
```

**Python Program**

<table>
<thead>
<tr>
<th>basketball</th>
<th>baseball</th>
</tr>
</thead>
<tbody>
<tr>
<td>football</td>
<td>volleyball</td>
</tr>
<tr>
<td>tennis</td>
<td>golf</td>
</tr>
<tr>
<td>lacrosse</td>
<td>soccer</td>
</tr>
<tr>
<td>badminton</td>
<td>bowling</td>
</tr>
<tr>
<td>skiing</td>
<td>diving</td>
</tr>
<tr>
<td>hockey</td>
<td>ice skating</td>
</tr>
<tr>
<td>biking</td>
<td>rugby</td>
</tr>
<tr>
<td>swimming</td>
<td>sailing</td>
</tr>
<tr>
<td>rowing</td>
<td>skateboarding</td>
</tr>
</tbody>
</table>
a. What does the program do? ________________________________________________________________

b. In the first line of code, what does the first ‘string argument’ for the function open represent? with open('sports.txt','r') as spList:


c. Replace the call to the function read() with the function readline(). Execute the program again. Explain the difference between the two functions: read() and readline().

2. Enter and execute the following code.

   ```python
   with open('sports.txt','r') as spList:
       for index in range(1,21):
           sp = spList.readline()
           print(str(index) + " ", sp)
   ```

   a. How does the output from this program differ from the output of the program that used the “read()” function? What caused the difference?

   b. What is the subtle difference in the output if the following print statement replaced the one above? Which is better?

      ```python
      print(index, " ", sp)
      ```

   c. What does str(index) do in the program above? Why is the str () function necessary?

   d. What happens when you change the arguments in the range() function to 1,10?

   e. What happens when you change the arguments in the range() function to (0, 30)?

   f. What do the results from “d.” and “e.” tell you about the arguments of the range() function when you are reading data from a file with a for loop?

**FYI:** The purpose of the rstrip() function returns a copy of the string after all characters have been stripped from the end of the string (default whitespace characters, EOL characters, and newline characters).
3. The following program is slightly different from the program in #2. Enter and execute the program.

```python
with open('sports.txt','r') as spList:
    for index in range(1,21):
        sp = spList.readline()
        print(str(index) + " ", sp.rstrip())
```

a. Compare the output from this program to the previous program. What is the difference?
________________________________________________________________________

b. What code caused the difference in the output?
________________________________________________________________________

c. Does the `rstrip()` function contain any arguments? How does it know what string to act upon?
________________________________________________________________________

________________________________________________________________________

d. `lstrip()` is a similar function. What do you think it does?
________________________________________________________________________

4. The following program is slightly different from the program in #3. Enter and execute the program.

```python
with open('sports.txt','r') as spList:
    for index in range(1,21):
        sp = spList.readline()
        if len(sp) >= 10:
            print(sp.rstrip())
```

a. What does the program display?
________________________________________________________________________
________________________________________________________________________

b. How many functions are used in this program?
________________________________________________________________________

c. Two functions use what is known as dot(.) notation. What are the two functions? and
________________________________________________________________________
________________________________________________________________________

d. Examine the output and explain what the `len()` function does.
________________________________________________________________________

Application Questions: Use the Python Interpreter to check your work

1. Create a text file that contains 10 numbers between 50 and 100. Write a program that reads the numbers from the file and totals the numbers. The program should print all the numbers and display the total when all the numbers have been added together. (Warning! The input from the file will be considered a string. Be sure to convert the input to `int` or `float` – just as you do when numbers are entered from the keyboard.)

________________________________________________________________________
________________________________________________________________________
2. a. Rewrite the following program to allow the user to enter the name of the file. Use the input to open the file.

```python
def processSports():
    spList = open('sports.txt')
    for index in range(1,21):
        sp = spList.readline()
        print(str(index) + ". ", sp.rstrip())
```  

```python
##### Call the function! #####
if __name__ == '__main__':
    processSports()
```  

b. How might you rewrite the code to ensure the file is closed when it’s no longer in use (see lecture notes)?

c. Compare the code from 2a with the following code. How is the for..loop different? How does the output differ? When might you use the 2a for..loop over this one?

```python
def processSports():
    spList = open('sports.txt')
    for sp in spList:
        print(sp.rstrip())
```  

```python
##### Call the function! #####
if __name__ == '__main__':
    processSports()
```