CS-521 Homework Assignment 3

Assignment Directions

Complete the 5 python coding problems below. Each is worth 10 points for a total of 50 points (100%).

Individual programs must be named with your BU email prefix (the part before @bu.edu) and the problem number. If your email is alex@bu.edu, then your first program in this assignment would be called: alex_hw_2_1.py

The programs must all be combined into a single zip file named with your email prefix and the assignment number. alex@bu.edu would name their submission alex_2.zip.

Style Requirements

For all assignments, follow the guidelines in the PEP8 Standards and Best Practices that have been shared to date, along with course specific requirements. Remember these to avoid minor deductions. In bold are new style requirements since the previous module.:

- **Name programs and zip container correctly**
  - **Among other things, names for regular programs and zip file must be all lower case.**
- Include a program docstring
- Stay under 80 characters on all code and comment lines
- Ask for input() with descriptive prompts telling users what is expected
  - **Especially remember to tell user what delimiter you're expecting when using split()**
- **Make sure to validate user input for data type, value range and other problem requirements**
- Print output that clearly explains what is being printed (where necessary)
  - In other words, don't just print a '5' unless it's clear what that 5 represents.
- **Import statements should be immediately after the program docstring**
- **Make sure to include # line comments (just a few in each program, don't go crazy)**
- **Use snake_case (lower case plus underscores) for variables**
- **CONSTANT variables must be all upper case and immediately following any import statements**

Do NOT use functions for this assignment.

Modules Allowed

You may only import the following modules into your programs and use their methods and attributes, unless first receiving special (and unlikely) permission from your facilitator:

- math
- os
- re
- string
- sys

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Programming Problems

The following includes concepts taught in Chapter 2

3.1: Write a Python program that counts the number of odd numbers, even numbers, squares of an integer and cubes of an integer from 2 to 130 (inclusive). For example, 9 is both odd and a square, 8 is even and a cube.

- Use constants to set the beginning and ending of the range.
- For output, print a title with the total range.
- For Odd and Even, print the totals and only the start and end of the range of the numbers in scope with three dots between them.
- For Squares and Cubes, print the totals and a list of the numbers that meet the criteria.
- Nothing printed should be hard coded.

Example of Output:

```
Checking numbers from 2 to 130
Odd (64): 3...129
Even (65): 2...130
Square (10): [4, 9, 16, 25, 36, 49, 64, 81, 100, 121]
Cube (4): [8, 27, 64, 125]
```

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The following includes concepts taught in Chapter 4

3.2: Write a Python program does all the following steps:

- Create a TUPLE constant with 3 sentence strings
- Using a loop calculate the number of:
  - uppercase letters
  - lowercase letters
  - digits
  - punctuation characters
    - Spaces are NOT considered punctuation.
- Output the results from each loop in columns that are neatly formatted, centered, labeled, and underlined.
  - Use Python 3's f-Strings or format() to solve.
  - Follow the output format in the example below.
  - The first column is the sentence number but starts counting at 1…. as humans do.

Hints:

- Check out the library attribute string.punctuation for help in solving this problem.
- The centering format character is a ^

Input Example 1 from the tuple: The rain in #Spain in 2019, rained "mainly' on the plain.

Output Example (input 1 is in bold for illustration purposes):

```
#    # Upper    # Lower    # Digits   # Punct.
-    -------     --------   --------   --------
1        2          36         4          5
2        7          26         0          7
3       11          18        18          2
```

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3.3: Write a Python program does all the following steps:

- Prompt users to enter a three-digit whole number such that the digits are in ascending order and without duplicates.

  Valid examples: 123 and 489
  Invalid examples: 133 and 174

- Loops and re-prompts the user until a correct value is entered.
  - Make sure to check whether the user entered the correct data type.
  - Prints a message with the specific error before reprompting

- Informs users when their number is accepted and exits program
-

Example Run:

```
Please enter a 3-digit integer: 122
Your number contains duplication.
Please enter a 3-digit integer: 1234
Error: You did not enter a 3-digit number.
Please enter a 3-digit integer: 1.23
Error: This is not an integer. Please re-enter.
Please enter a 3-digit integer: 376
Error: The digits are not in ascending order.
Please enter a 3-digit integer: 348
Number Accepted!
```

The following includes concepts taught in Chapter 6

3.4: Write a Python program does all the following steps:

- Read a file located in the same directory as the program named: **cs521_3_4_input.txt**
  - Print a clear error message and end the program if the file is missing
  - The program must not crash because the file doesn't exist
  - **You do not need to supply this file with your assignment**
- Validate that the file contains a single sentence of 20 words.
  - Print a clear error message and end the program if the file contains anything different.
  - Use a constant variable to set the number of words allowed in the file
- Break up the sentence into four lines of five single spaced words
  - Use a constant variable to set the number of words per line
- Write the lines to a new text file named: **cs521_3_4_output.txt**
  - Automatically overwrite the output file if it already exists

Notes:

- Do not hardcode your string slices
- You are not to include any text files from this problem in your zip container
- *Remember to properly close all files.*

The following includes concepts taught in Chapter 14

3.5: Perform the following steps:

- Manually create a text file named **cs521_3_5_input.txt**
- Populate the file with rows of comma separated records in of the format:
  - Name of Student
  - Student ID
  - GPA

For example (you can use your own names and data):

Jerry Seinfeld, 1, 3.7
Elaine Benes, 52, 2.8
George Costanza, 13, 3.9
Cosmo Kramer, 24, 3.4

Include this file in the zip container you submit for this assignment

- Write a program to read the file in the same directory, line by line and store all the records as a **list of tuples**.
- After the file is completely processed, simply print the array that you created.
  - There is no output file!

Note:

- Include your input file in your zip container
- *Remember to properly close all files.*

Where to submit?

Click Assignments in the Navigation Area and then click on the title of the assignment to enter the submission area and upload your response.