**CIS 3260 – Introduction to Programming**

**Individual Assignment 6**

**Submission:**

* Add your full name and email address as comments on top of each python program. Add appropriate comments at other locations of your python programs for readability.
* Name your python program as IA6Q#.py. For example, for question #1, your program should have a name IA6Q1.py
* For each question, put corresponding answers in a word document. Name your word document as **IA6.doc**
* Submit following items into iCollege -> Assessment -> Assignment 6
  + IA6.doc
  + IA6Q1.py
  + IA6Q2.py
  + IA6Q3.py

[Some Comments from your instructor]:

I highly recommend you use PyCharm to write following two programs. You can open existing python project and create two new python files IA6Q1.py, IA6Q2.py and IA6Q3.py.

**1. [ Objectives: 5.1,5.2,5.3]**

1) [33 points] Write a program that reads an unspecified number of integers, determines how many even numbers have been read, and computes the average of the input values ~~(not counting zeros)~~. Your program ends with the input "End". It displays the average as a floating-point number and rounds it to 2 decimal places.

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| **Sample Run 1**  Enter an integer, the input ends if user enters " End ": 1  Enter an integer, the input ends if user enters " End ": 2  Enter an integer, the input ends if user enters " End ": -1  Enter an integer, the input ends if user enters " End ": 3  Enter an integer, the input ends if user enters " End ": 0  Enter an integer, the input ends if user enters " End ": End  The number of even numbers is 2  The average is 1.0  **Sample Run 2**  Enter an integer, the input ends if user enters "End": End  No numbers are entered |

A. [5 points] System Analysis: What is(are) the input(s) and output(s)?

B. [3 points] Assume we plan to use loop in the program, describe what action should be repeated in English.

C. [4 points] Assume we have stored one input number into an integer variable data, how to write the condition used in the while loop header in Python?

D. [3 points] What step should be added to control the loop to let the condition become true eventually? Please describe this step in English.

D. [5 points] System Design: List the steps to get output(s) from input(s) in English

E. [5 points] Write your program and put your source code here.

F. [2 points] A screenshot of the output of program

2) Share with us ONE error you experienced when writing this program. [ It is common to experience errors. I will be surprised if you do not see any errors. In case this happens, you can make some errors by yourself.]

A. [2 pts] Explain what is the type of the error (syntax, run-time, or logical error)?

B. [2 pts] How you resolve it?

C. [2 pts] How much time you spent to resolve it?

**2. [ Objectives: 5.3,5.4]**

1) [36 points] Assume letters A, E, I, O, and U as the vowels. Write a program that prompts the user to enter a string and displays the number of vowels and consonants in the string. We ignore cases when counting frequency of vowels and consonants.

Hint: use a for loop; in range function, the stop should be the length of entered string.

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| **Sample Run**  Enter a string: Programming is fun  The number of consonants is 11  The number of vowels is 5 |

A. [5 points] System Analysis: What is(are) the input(s) and output(s)?

B. [3 points] Describe what action should be repeated in English.

C. [4 points] Assume we use an integer variable i at the for loop header, how to write the for loop header.

D. [5 points] System Design: List the steps to get output(s) from input(s) in English

E. [5 points] Write your program and put your source code here.

F. [2 points] A screenshot of the output of program

2) Share with us TWO errors you experienced when writing this program.

**I . Error 1**

A. [2 pts] Explain what is the type of the error (syntax, run-time, or logical error)?

B. [2 pts] How you resolve it?

C. [2 pts] How much time you spent to resolve it? 3 pts

**II. Error 2**

A. [2 pts] Explain what is the type of the error (syntax, run-time, or logical error)?

B. [2 pts] How you resolve it?

C. [2 pts] How much time you spent to resolve it?

**3. [ Objectives: 5.3,5.4, 6.1-6.5]**

1) [31 points] Let us repeat the question from IA 5 below. But this time, we will use a for loop to make our program shorter and define a function to make our program be more organized. Hint: in the range function, the stop should be 9.

Assume you are working in a library. You are given a task to develop an ISBN-9 to ISBN-10 converter. An ISBN-10 (International Standard Book Number) consists of 10 digits: . The last digit, , is a checksum, which is calculated from the other nine digits using the following formula:

If the checksum is 10, the last digit is denoted as X according to the ISBN-10 convention. Write a program that prompts the user to enter the first 9 digits and displays the 10-digit ISBN (including leading zeros).

Note: your program should be able to check if the input string has a length of 10 or not.

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| **Sample Run 1**  Enter the first 9 digits of an ISBN as a string: 3601267  Incorrect input. It must have exact 9 digits  **Sample Run 2**  Enter the first 9 digits of an ISBN as a string: 013601267  The ISBN-10 number is 0136012671  **Sample Run 3**  Enter the first 9 digits of an ISBN as a string: 013031997  The ISBN-10 number is 013031997X |

A. [3 points] Assume we are going to develop a function. It should take one string argument (the 9-digit ISBN) and return a string value (the 10-digit ISBN) as the result. How to define the header of this function? You can use any names for the function name and parameter name.

B. [4 points] How to call the function at question **A**? (Please provide one example.)

D. [5 points] How to define the body of the function at question A? (Please write down a complete function definition including both header and body). Note: The function does not print out any messages.

E. [5 points] Write a complete program which creates the function and calls the function to meet the requirements.

F. [2 points] A screenshot of the output of program

2) Share with us TWO errors you experienced when writing this program.

**I . Error 1**

A. [2 pts] Explain what is the type of the error (syntax, run-time, or logical error)?

B. [2 pts] How you resolve it?

C. [2 pts] How much time you spent to resolve it? 3 pts

**II. Error 2**

A. [2 pts] Explain what is the type of the error (syntax, run-time, or logical error)?

B. [2 pts] How you resolve it?

C. [2 pts] How much time you spent to resolve it?

***Objectives:***

**Week 4**

--- Chapter 3 ---

3.1 To write Boolean expressions using relational operators (§3.2).

3.2 To program with Boolean expressions (§3.3).

3.3 To implement selection control using one-way if statements (§3.4).

3.4 To implement selection control using two-way if-else statements (§3.5).

3.5 To implement selection control with nested if and multi-way if-elif-else statements (§3.6).

3.6 To combine conditions using logical operators (and, or, and not) (§3.10).

3.7 To use selection statements with combined conditions (§§3.11–3.12).

**Week 7**

--- Chapter 4 ---

4.1 To solve mathematics problems by using the functions in the math module (§4.2)

4.2 To represent and process strings and characters (§[4.3](about://ch04_pg0004.xhtml#P7001015381000000000000000001655)).

4.3 To encode characters using ASCII and Unicode (§[4.3.1](about://ch04_pg0005.xhtml#P7001015381000000000000000001674)).

4.4 To use the ord function to obtain a numerical code for a character and the chr function to convert a numerical code to a character (§[4.3.2](about://ch04_pg0006.xhtml#P70010153810000000000000000016C2)).

4.5 To represent special characters using the escape sequence (§[4.3.3](about://ch04_pg0007.xhtml#P70010153810000000000000000016E4)).

4.6 To test substrings using the in and not in operators (§[4.3.8](about://ch04_pg0012.xhtml#P70010153810000000000000000017AC)).

4.7 To compare strings (§[4.3.9](about://ch04_pg0013.xhtml#P70010153810000000000000000017BD)).

4.8 To use string functions min, max, and len (§[4.3.10](about://ch04_pg0014.xhtml#P70010153810000000000000000017F4)).

**Week 8**

--- Chapter 4 ---

4.9 To obtain a character in a string using the index operator [] (§[4.3.11](about://ch04_pg0015.xhtml#P7001015381000000000000000001812)).

4.10 To obtain a substring in a string using the slicing operator [start : end] (§[4.3.12](about://ch04_pg0016.xhtml#P700101538100000000000000000183A)).

4.11 Use repetition operator \* to duplicate strings (§[4.3.6](about://ch04_pg0016.xhtml#P700101538100000000000000000183A)).

4.12 To introduce objects and methods (§[4.5](about://ch04_pg0018.xhtml#P7001015381000000000000000001897)).

4.13 To introduce the methods in the str class (§[4.6](about://ch04_pg0019.xhtml#P70010153810000000000000000018E5)).

4.14 To program using characters and strings (§[4.7.1](about://ch04_pg0023.xhtml#P7001015381000000000000000001A05)).

4.15 To invoke the print function with the end argument (§[4.3.4](about://ch04_pg0008.xhtml#P7001015381000000000000000001752)).

--- Chapter 5 ---

5.1 To write programs for executing statements repeatedly using a while loop (§[5.2](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch05_pg0003.xhtml#P7001015381000000000000000001E16)).

**Week 9**

--- Chapter 5 ---

5.2 To control a loop with the user’s confirmation and a sentinel value (§[5.5](about://ch05_pg0006.xhtml#P7001015381000000000000000001EDE)).

5.3 To develop loops following the loop design strategy (§[5.4](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch05_pg0005.xhtml#P7001015381000000000000000001EB9)).

5.4 To use for loops to implement counter-controlled loops (§[5.6](about://ch05_pg0007.xhtml#P7001015381000000000000000001F2E)).

5.6 To implement program control with break. (§[5.10](about://ch05_pg0011.xhtml#P7001015381000000000000000002091)).

**Week 10**

--- Chapter 6 ---

6.1 To understand what is a function (§[6.1](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch06_pg0003.xhtml))

6.2 To define functions with formal parameters (§[6.2](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch06_pg0003.xhtml)).

6.3 To distinguish the differences between the functions that return and do not return a value (§[6.4](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch06_pg0005.xhtml)).

6.4 To invoke functions with actual parameters (i.e., arguments) (§[6.3](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch06_pg0004.xhtml)).

6.5 To determine the scope of variables (§[6.8](https://revel-ise.pearson.com/eps/sanvan/api/item/d8b7c6af-d0aa-4ead-8cc3-091aee26113e/1/file/liang-p-1e_Revel_v3/OPS/xhtml/ch06_pg0009.xhtml))