***BE 1600***

***Introduction to***

***Programming and Computation***

***Python***

**Project 01**

40 points

**Due 11/15/2023 (11:45 A.M.)**

**Objectives**

1. To use selections and repetition structures
2. To deal with Functions
3. Learn about the difference between local and global variables
4. To validate user inputs

**Requirements:**

* Using Python IDE software, write a program for each of the problems. Includes informative comments.
* Test the code for each problem and verify that the program works.

**Restrictions:**

You must work individually. Use only material from class or from the textbook (chapters 1-5). All code must be the work of the individual. Do not share your code or copy from external resources.

**Submission**

Convert your python files to text files and submit two .txt files to Canvas by the due date

*Solution for this assignment will not be posted on Canvas; however, the solution of any of the assignment problems can be discussed in the class upon request of a student.*

All assignments must be submitted by the Canvas. **No email or hard copy** is accepted. You must follow the following format:

1. For non-programming questions, use a word file to type your answers. Don’t use the text box on the Canvas to answer the questions or to write comments, we will not read it. State your answer clearly.
2. For programming questions, include only the source file of each programming problem.
3. Submit your files to the Canvas. You must submit your files on time; otherwise, you will receive zero.
4. Use “Add Another File” feature on Canvas to upload each additional file; do not upload the files as a compressed folder.
5. You can upload your files as many times as you like. Only the last attempt counts because the last files you uploaded are the only files your instructor will see.
6. There will be several modules on the Canvas. You need to upload your files using the correct module on the Canvas.
7. Name each file: *Assignment (assignment number)* for the word file [e.g. Assignment 02] and *Assignment (assignment number) \_ (Question number)* for each programming question [e.g. Assignment 02\_Q03].
8. To upload your file(s):

* In Course Navigation, click the ASSIGNMENTS module.
* Click the title of the assignment.
* Click the **Submit** Assignment button.
* Add **File**. ...
* Add Another **File**. ...
* **Submit** Assignment. ...
* View **Submission**.

*It is your responsibility to make sure that each file is uploaded correctly. If you uploaded a wrong file, you receive zero; files will not be accepted after due date even if you have a prove that the file is created before the due date.*

***Make sure you review the Cheating & Plagiarism policy on Canvas.***

**Question 01 - Fraction calculator (20 points)**

Write a program that lets the user perform arithmetic operations on fractions. Fractions are of the form a/b, in which a and b are integers and b != 0. Your program must be *menu driven*, allowing the user to select the operation (+, -, \*, or /) and input the numerator and denominator of each fraction. Furthermore, your program must consist of at least the following functions:

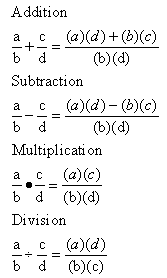
1. Function menu: This function informs the user about the program’s purpose, explains how to enter data, and allows the user to select the operation.
2. Function addFractions: This function takes as input four integers representing the numerators and denominators of two fractions, adds the fractions, and returns the numerator and denominator of the result. (Notice that this function has a total of four parameters.)
3. Function subtractFractions: This function takes as input four integers representing the numerators and denominators of two fractions, subtracts the fractions, and returns the numerator and denominator of the result. (Notice that this function has a total of four parameters.)
4. Function multiplyFractions: This function takes as input four integers representing the numerators and denominators of two fractions, multiplies the fractions, and returns the numerators and denominators of the result. (Notice that this function has a total of four parameters.)
5. Function divideFractions: This function takes as input four integers representing the numerators and denominators of two fractions, divides the fractions, and returns the numerator and denominator of the result. (Notice that this function has a total of four parameters.)

Your answer need not be in the lowest terms. Your program must validate all users’ inputs:

* Selecting a valid item from the menu
* Entering a non-zero value for the denominator; allow the user to re-enter a valid value.

Do not use global variables.

**Operations on Fractions**



*Question 01 Grading Criteria:*

* *Parts a to e, 2 points each.*
* main function that calls all other functions and allows the user to select from the menu more than one time, 7 points.
* *User input validation, 3 points.*

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| **Question 01 Sample output**  This program performs operations on fraction. Enter  1 : To add fraction  2 : To subtract fraction  3 : To multiply fraction  4 : To divide fraction  9 : To exit the program  **1**  For fraction 1  Enter the numerator: **2**  Enter the denominator: **6**  For fraction 2  Enter the numerator: **8**  Enter the denominator: **2**  2/6 + 8/2 = 52/12  This program performs operations on fraction. Enter  1 : To add fraction  2 : To subtract fraction  3 : To multiply fraction  4 : To divide fraction  9 : To exit the program  **4**  For fraction 1  Enter the numerator: **9**  Enter the denominator: **0**  The denominator must be nonzero.  Enter the denominator: **0**  Enter the denominator: **0**  Enter the denominator: **3**  For fraction 2  Enter the numerator: **0**  To divide, the second fraction must be nonzero.  Enter a nonzero number for the numerator: **0**  Enter a nonzero number for the numerator: **2**  Enter the denominator: **0**  The denominator must be nonzero.  Enter the denominator: **0**  Enter the denominator: **8**  9/3 / 2/8 = 72/6  This program performs operations on fraction. Enter  1 : To add fraction  2 : To subtract fraction  3 : To multiply fraction  4 : To divide fraction  9 : To exit the program  **2**  For fraction 1  Enter the numerator: **1**  Enter the denominator: **2**  For fraction 2  Enter the numerator: **3**  Enter the denominator: **4**  1/2 - 3/4 = -2/8  This program performs operations on fraction. Enter  1 : To add fraction  2 : To subtract fraction  3 : To multiply fraction  4 : To divide fraction  9 : To exit the program  **3**  For fraction 1  Enter the numerator: **5**  Enter the denominator: **6**  For fraction 2  Enter the numerator: **7**  Enter the denominator: **8**  5/6 \* 7/8 = 35/48  This program performs operations on fraction. Enter  1 : To add fraction  2 : To subtract fraction  3 : To multiply fraction  4 : To divide fraction  9 : To exit the program  **9** |

**Question 02 – Time Conversion (20 points)**

Write a program to convert the time from 24-hour notation to 12-hour notation and vice versa. Your program must be menu driven, giving the user the choice of converting the time between the two notations and to quit the program. Furthermore, your program must contain at least the following function:

1. a function to convert the time from 24-hour notation to 12-hour notation and returns the new time.
2. a function to convert the time from 12-hour notation to 24-hour notation and returns the new time.
3. a function to display the choices.
4. function(s) to get the input values and returns them.
5. function(s) to display the results. For 12-hour time notation, your program must display AM or PM.; for both times, the program must display each of hours, minutes, and second in two digits.
6. main function that calls all other functions and allows the user to select from the menu more than one time.

Do not use global variables.

*Question 02 Grading Criteria:*

* *parts a, b, e, and f, 4 points each*
* *parts c and d, 2 points each*

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| **Question 02 Sample output**  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  1  Enter hours: 9  Enter minutes: 7  Enter seconds: 5  Enter AM/PM: AM  The time is:  09:07:05  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  1  Enter hours: 11  Enter minutes: 8  Enter seconds: 10  Enter AM/PM: PM  The time is:  23:08:10  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  2  Enter hours: 0  Enter minutes: 25  Enter seconds: 4  The time is:  12:25:04 AM  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  2  Enter hours: 5  Enter minutes: 12  Enter seconds: 10  The time is:  05:12:10 AM  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  2  Enter hours: 19  Enter minutes: 3  Enter seconds: 12  The time is:  07:03:12 PM  Enter--  1: To convert time from 12-hour notation to 24-hour notation.  2: To convert time from 24-hour notation to 12-hour notation.  99: To quit the program.  99 |

**Extra Credit – Coffee Shop (25 points)**

***Points earned in this part can be added to exams or assignments.***

Jason opened a coffee shop at the beach and sells coffee in three sizes: small (9oz), medium (12oz), and large (15oz). The cost of one small cup is $1.75, one medium cup is $1.90, and one large cup is $2.00.

Write a menu-driven program that will make the coffee shop operational. Your program should allow the user to do the following:

* Buy coffee in any size and in any number of cups.
* At any time show the total number of cups of each size sold.
* At any time show the total amount of coffee sold.
* At any time show the total money made.

Your program should consist of at least the following functions:

1. a function to print the menu
2. a function to order the coffee (option 1)
3. a function to check the total money made up (option 2),
4. a function to check the total amount of coffee sold up (option 3)
5. a function to check the number of cups of coffee of each size sold (option 4)
6. a function that print the data (option 5).

Your program should not use global variables. Special values such as coffee cup sizes and cost of a coffee cup must be declared as named constants.

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| **Extra Credit Sample output**  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **1**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **1**  Enter the number of cups: **2**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **9**  Please pay $3.5  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **1**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **3**  Enter the number of cups: **1**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **2**  Enter the number of cups: **3**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **9**  Please pay $7.70  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **2**  Total money made: $11.2  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **3**  Total amount of coffee sold: 69 oz  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **4**  Small cup count: 2  Medium cup count: 3  Large cup count: 1  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **5**  Small cup count: 2  Medium cup count: 3  Large cup count: 1  Total amount of coffee sold: 69 oz  Total money made: $11.2  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **1**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **1**  Enter the number of cups: **1**  1: Enter 1 to buy coffee in a small cup size (9 oz)  2: Enter 2 to buy coffee in a medium cup size (12 oz)  3: Enter 3 to buy coffee in a large cup size (15 oz)  9: Enter 9 to exit.  **9**  Please pay $1.75  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **5**  Small cup count: 3  Medium cup count: 3  Large cup count: 1  Total amount of coffee sold: 78 oz  Total money made: $12.95  1: Enter 1 to order coffee.  2: Enter 2 to check the total money made up to this time.  3: Enter 3 to check the total amount of coffee sold up to this time.  4: Enter 4 to check the number of cups of coffee of each size sold.  5: Enter 5 to print the data.  9: Enter 9 to exit the program.  **9** |