EECS 10: Homework 2

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Due Wednesday, October 16, 2019 at 12:00pm

1 Part 1: Exercise 2.16, page 59 [10 points]

When you run your program, it should look like this:

```
Please enter two numbers.
Number 1: 5
The first number is 5.
Number 2: 2
The second number is 2.
The sum is 7.
The product is 10.
The difference is 3.
The quotient is 2.
The remainder is 1.
```

The files that you should submit for this part of the assignment are:

- **numbers.c**: the source code file.

- **numbers.txt**: the brief text file to explain what the program does and why you chose your method of implementation (**no more than 5 sentences**).

- **numbers.script**: the typescript file to show that your program works with the numbers shown above, as well as with 27 and 42.

2 Part 2: Adding Liquid Volumes [30 Points]

Write a C program that computes the sum of two liquid volumes specified in US measures. In particular, your program should prompt for the number of gallons, quarts, pints, cups, fluid ounces, table spoons, and tea spoons for 2 liquid volume "tuples", then display the sum of the two as result. In addition, display each liquid value after it has been entered.

When you run your program, it should look like this:

```
Please enter two liquid volumes:
First volume, gallon(s): 4
First volume, quart(s): 1
First volume, pint(s): 0
First volume, cup(s): 1
First volume, fluid ounce(s): 4
```

```
First volume, table spoon(s): 0
First volume, tea spoon(s): 1
Liquid volume 1 is 4 gallon(s), 1 quart(s), 0 pint(s), 1 cup(s),
4 fluid ounce(s), 0 table spoon(s), and 1 tea spoon(s).

Second volume, gallon(s): 8
Second volume, quart(s): 2
Second volume, pint(s): 1
Second volume, cup(s): 0
Second volume, fluid ounce(s): 3
Second volume, table spoon(s): 1
Second volume, tea spoon(s): 1
Liquid volume 2 is 8 gallon(s), 2 quart(s), 1 pint(s), 0 cup(s),
3 fluid ounce(s), 1 table spoon(s), and 1 tea spoon(s).

The sum is 12 gallon(s), 3 quart(s), 1 pint(s), 1 cup(s),
7 fluid ounce(s), 1 table spoon(s), and 2 tea spoon(s).
```

All variables for this part of the assignment must be declared as `ints`. Summed values for tea spoons, table spoons, fluid ounces, cups, pints, quarts must carry over if greater than 3, 1, 1, 7, 1, and 2, respectively (Remember that US measurements are as follows:

```
1 gallon = 4 quarts
1 quart = 2 pints
1 pint = 2 cups
1 cup = 8 fluid ounces
1 fluid ounce = 2 table spoons
1 table spoon = 3 tea spoons
```

Note that the user may enter values can be any positive number. For example, the user may enter 10 tea spoons (see example below).

The following example demonstrates how carryover should work:

```
Please enter two liquid volumes:
First volume, gallon(s): 1
First volume, quart(s): 3
First volume, pint(s): 2
First volume, cup(s): 12
First volume, fluid ounce(s): 5
First volume, table spoon(s): 6
First volume, tea spoon(s): 1
Liquid volume 1 is 1 gallon(s), 3 quart(s), 2 pint(s), 12 cup(s),
5 fluid ounce(s), 6 table spoon(s), and 1 tea spoon(s).

Second volume, gallon(s): 6
Second volume, quart(s): 4
Second volume, pint(s): 16
Second volume, cup(s): 11
Second volume, fluid ounce(s): 21
Second volume, table spoon(s): 8
Second volume, tea spoon(s): 10
Liquid volume 2 is 6 gallon(s), 4 quart(s), 16 pint(s), 11 cup(s),
21 fluid ounce(s), 8 table spoon(s), and 10 tea spoon(s).

The sum is 12 gallon(s), 2 quart(s), 1 pint(s), 1 cup(s),
2 fluid ounce(s), 1 table spoon(s), and 2 tea spoon(s).
```

Hint: **You may not use `if` statements for this assignment**. Instead, convert and store each liquid volume tuple as tea spoons before the addition in order to properly handle carryover in your computation. After you obtain your sum, convert it back to a liquid volume tuple so that it can be displayed. You will need to use the * (multiplication), / (division), % (modulo), and + (addition) operators to make this work.

The files that you should submit for this part of the assignment are:

- **volumes.c**: the source code file.

- **volumes.txt**: the brief text file to explain the design of your program, i.e. the steps required for the calculation (**no more than 5 sentences**).

- **volumes.script**: the typescript file to the program output for summing the following 2 liquid volumes:
  1 gallons, 4 quarts, 12 pints, 100 cups, 67 fluid ounces, 3 table spoons, and 19 tea spoons,
  and 8 gallons, 51 quarts, 6 pints, 11 cups, 8 fluid ounces, 4 table spoons, and 23 tea spoons.

3   Bonus [5 Points]

Extend Part 2 above to also convert the input liquid volumes from non-metric to metric units (1 US gallon = 3.7854 liters). Use the same file as in Part2 and convert the two input liquid volumes into liters.

Hint: You may use floating point variables and type conversion for this bonus work.

To submit, use the same files as in Part 2, i.e. **volumes.c**, **volumes.txt**, and **volumes.script**. Just add your code lines for this bonus part in these files.

4   Submission

Submission for these files will be similar to last week's assignment. The only difference is that you need to create a directory called **hw2/**. Put all the files for assignment 2 in that directory and run the the ~**eecs10/bin/turnin.sh** command to submit your homework.