CSE 1321L: Programming and Problem Solving I Lab

Lab 3

Types, Rounding, and Expressions

What students will learn:

* Printing to the screen (i.e. prompting the user)
* Creating variables and assigning values variables
* Reading input from the user and storing it into a variable
* Doing basic calculations with variables to generate a solution

Overview: In this lab, you’re going to continue practicing your coding skills by writing programs that interact with the user and do calculations using variables. The labs below also reinforce the concept of creating variables that hold “intermediate solutions” to avoid having one “giant” equation. What you should focus on is trying to understand the problem, understanding the steps needed to solve it, and then converting them into a working program. Make sure that files are called Lab3A.py, Lab3B.py and Lab3C.py. Also, please note that while the structure of the output of your program needs to match the samples provided, your solution needs to be correct for any given input.

**Lab3A:** *Credit Cards*. Financial advisors will almost always tell you that you should pay for things in cash and avoid credit card debt. Further, they tell you that you should have a small emergency fund that you keep stocked for emergencies like flat tires, dead refrigerators and so on. However, life doesn’t always work that way and sometimes we need to charge things to our credit cards. So, for this part of the lab, we’re going to write a calculator that calculates your minimum monthly payment on your card.

To create this calculator, we will ask the user for the current balance on their credit card and the APR (Annual Percentage Rate) of the card. To calculate the minimum payment, you will multiply the current balance on the credit card (also called the amount owed) times APR and divide this number by 12 since there are 12 months in a year. The formula is:

*Amount Owed × APR ÷ 12 = Minimum Payment*.

The input APR is a percentage, so be sure to divide it by 100 when calculating the minimum payment. The Monthly Percentage Rate is calculated by dividing the APR by 12 since there are 12 months in a year. When printing the monthly percentage rate and the minimum payment, make sure to round them to 3 and 2 decimal places, respectively. You can round any float by putting it inside round():

print(round(3.14159, 2)) #prints PI rounded to two decimal places

Below are two example runs. The user input is in **bold** (notice the dollar sign is not part of the user input).

|  |  |
| --- | --- |
| Sample run 1:  Amount owed: $**2000**  APR: **19.75**  Monthly percentage rate: 1.646  Minimum payment: $32.92 | Sample run 2:  Amount owed: $**8500**  APR: **29**  Monthly percentage rate: 2.417  Minimum payment: $205.42 |

**Lab3B:** *GPA calculator*. We’re getting more practice making calculators! GPA is important. It’s one of the many things that employers look at when recruiting new candidates. You also need a GPA of at least 2.0 to graduate from KSU. GPA is measured by “quality points” using the following scale:

A = 4 quality points

B = 3 quality points

C = 2 quality points

D = 1 quality point

F = 0 quality points

Each course counts for a certain number of credit hours. For instance, most courses are 3 credit hours. This lab is a 1 credit hour course. Calculus counts 4 credit hours. To calculate the quality points for one course, multiply the number of hours of that course with the quality points you earn for that course.

To calculate your GPA for the whole semester, you take the total number of quality points earned that semester and divide it by the total number of hours taken that semester.

For this lab, write a program that reads from the user the number of hours and quality points earned for four courses then calculates the total hours, total quality points and GPA. When printing the total amount of hours and quality points, print them as integers. When printing the GPA, print it as a float, rounded to 2 decimal places. Example runs are shown below. The user input is in **bold**.

|  |  |
| --- | --- |
| Sample run 1:  Course 1 hours: **4**  Grade for course 1: **4**  Course 2 hours: **3**  Grade for course 2: **3**  Course 3 hours: **3**  Grade for course 3: **4**  Course 4 hours: **4**  Grade for course 4: **4**  Total hours: 14  Total quality points: 53  Your GPA for this semester is 3.79 | Sample run 2:  Course 1 hours: **4**  Grade for course 1: **1**  Course 2 hours: **1**  Grade for course 2: **4**  Course 3 hours: **3**  Grade for course 3: **4**  Course 4 hours: **3**  Grade for course 4: **3**  Total hours: 11  Total quality points: 29  Your GPA for this semester is 2.64 |

**Lab3C:** *Sandwiches.* We are going to design a program that determines how long a microwave oven at a sandwich shop will run. The program will prompt the user to enter how many of each sandwich type needs to be cooked. It will then print out the number of sandwiches entered for each sandwich type on separate lines and calculate the total amount of time the oven will have to run to cook them all. Below is a table showing how long each sandwich needs to stay in the oven:

|  |  |
| --- | --- |
| Small | 30 seconds |
| Medium | 60 seconds |
| Large | 1 minute and 15 seconds |
| Extra Large | 2 minutes and 15 seconds |

The number of minutes and seconds must be printed as integers. Example runs are shown below. The user input is in **bold**.

Sample run 1:

Enter the number of small sandwiches: **2**

Enter the number of medium sandwiches: **2**

Enter the number of large sandwiches: **2**

Enter the number of extra-large sandwiches: **2**

You've entered 2 small sandwiches.

You've entered 2 medium sandwiches.

You've entered 2 large sandwiches.

You've entered 2 extra-large sandwiches.

Total cooking time is 10 minutes and 0 seconds.

Sample run 2:

Enter the number of small sandwiches: **2**

Enter the number of medium sandwiches: **3**

Enter the number of large sandwiches: **4**

Enter the number of extra-large sandwiches: **5**

You've entered 2 small sandwiches.

You've entered 3 medium sandwiches.

You've entered 4 large sandwiches.

You've entered 5 extra-large sandwiches.

Total cooking time is 20 minutes and 15 seconds.

**Instructions:**

* Programs must be working correctly.
* Programs must be saved in files with the correct file name.
* Programs (source code files) must be uploaded to Gradescope by due date.