COSC 1336: Fall 2022

Assignment for Chapter 8

DUE: October 25, 2022, by 1 AM

20% PENALTY PER EACH DAY

Important Notice:

- Please make sure your code runs on the online book to receive any credit.
- **Submit your own work**. Copying of code from the web or each other is strictly prohibited and will be acted on as a violation of academic honesty policy.

This assignment focuses on While loops

[30 points] Question 1

Write a function to explain to bank customers the math of credit card debt and payments. Assume that a customer owes $1000. The purpose is to calculate and return the number of months it will take to pay off the balance for a specified interest rate and specified fixed monthly payments. Specifically, you must write a function:

CreditPay(rate, payment, verbose) where

rate is the monthly rate of interest

payment is the monthly payment

verbose is a Boolean parameter, and its impact is as follows:

If verbose is **False**, the function will print the amount of the final payment and the total amount of money paid. (Note that the final payment may be less than the regular monthly payment as it equals the balance left in the last month.)

If verbose is **True,** then additionally, the function will print the remaining balance at the end of each month.

The function will always return the number of months taken to complete the payment

Illustration:

If you coded the function correctly, then the following code:

```
nmonths = CreditPay(2.5,100,False)
print(f"Number of months to pay off is {nmonths}")
```

will print as below:

```
Final payment is $ 63.74002659619978
Total amount paid is $ 1163.7400265962
Number of months to pay off is 12
```

and the following code

```
nmonths = CreditPay(2.5,100,True)
print("Number of months to pay off is", nmonths)
```

will print as below

```
Balance after month 1 is $ 925.0
Balance after month 2 is $ 848.125
Balance after month 3 is $ 769.328125
Balance after month 4 is $ 688.561328125
Balance after month 5 is $ 605.7753613281251
Balance after month 6 is $ 520.9197453613282
Balance after month 7 is $ 433.9427389953614
Balance after month 8 is $ 344.7913074702454
Balance after month 9 is $ 253.4110901570016
Balance after month 10 is $ 159.7463674109266
Balance after month 11 is $ 63.74002659619978
Final payment is $ 63.74002659619978
Total amount paid is $ 1163.7400265962
Number of months to pay off is 12
```

[30 points] Question 2

Write a Python function **isPrime(number)** that determines if the integer argument **number** is prime or not. The function will return a Boolean **True** or **False**.

Next, write a function **HowManyPrimes(P)**, that takes an integer **P** as argument and returns the number of prime numbers whose value is less than **P**.

And then write a function **FindPrime(K)** that takes integer **K** as an argument and returns the smallest prime with value more than **K**.

You determine a number is prime by checking if it is divisible by a smaller number. Both **HowManyPrimes()** and **FindPrime()** should call **isPrime().**

Illustration:

If you coded the function correctly, then the following code:

```
newnum = int(input("Your number: "))
if isPrime(newnum):
    print (f"{newnum} is a prime number.")
else:
    print(f"{newnum} is NOT a prime number.")
print(f"The total prime numbers less than {newnum} is {HowManyPrimes(newnum)}.")
print(f"The first prime number greater than {newnum} is {FindPrime(newnum)}.")
```

It will print as follows if the user types 50 as an input:

```
50 is NOT a prime number.
The total prime numbers less than 50 is 15.
The first prime number greater than 50 is 53.
```

[40 points] Question 3

You are asked to develop a cash register for a 'fun cart' that sells balloons and popsicles. The program first asks the name of the shop owner and the price of balloons and popsicles.

Subsequently, the program will **repeatedly** ask the name of the customer and the number of balloons and popsicles they would like to buy. And then print a summary of what they purchased along with the bill as illustrated in the session below. The program will stop when the shop owner's name is entered and print the total sales for the day:

Program prompts: **Hi Fun Cart Seller, what is your name?**
User types: **Tom**
Program prompts: **What is the price of a Balloon today?**
User types: **1.40**
Program prompts: **What is the price of a Popsicle today?**
User types: **0.75**
Program outputs: **Balloons are $1.40 each. Popsicles are $0.75 each.**

Program prompts: **Who is the next customer?**
User types: **Harry**
Program prompts: **Balloons are $1.40 each. How many Balloons?**
User types: **1**
Program prompts: **Popsicles are $0.75 each. How many Popsicles?**
User types: **2**
Program outputs: **Harry, you bought 1 Balloon and 2 Popsicles.** ^
The total is $2.90.

Program Prompts: **Who is the next customer?**
User types: **Sandy**
Program Prompts: **Balloons are $1.40 each. How many Balloons?**
User types: **10**
Program Prompts: **Popsicles are $0.75 each. How many Popsicles?**
User types: **4**
Program outputs: **Sandy, you bought 10 Balloons and 4 Popsicles.**
The total is $17.00.

Program Prompts: **Who is the next customer?**
User types: **Tom**
Program outputs: **Tom, it is time to close the store.**
We sold 11 Balloons and 6 Popsicles for a total of $19.90.

^ Note that 'Balloon' is singular. Consider coding a simple function **isPlural(word, number)** where the word is a string and number is an integer. For example, when Harry orders 1 balloon (**balloon = 1**), the function **isPlural("Balloon", balloon)** returns "Balloon". On the other hand, when Sandy orders 10 balloons (**balloon = 10**), the function **isPlural("Balloon", balloon)** returns "Balloons". Likewise, **isPlural("Popsicle", popsicle)** returns "Popsicle" if **popsicle = 1** or "Popsicles" if **popsicle > 1**.

After the program ends, following outputs will be present (not including inputs):

```
Balloons are $1.40 each. Popsicles are $0.75 each.

Harry, you bought 1 Balloon and 2 Popsicles.
The total is $2.90.

Sandy, you bought 10 Balloons and 4 Popsicles.
The total is $17.00.

Tom, it is time to close the store.
We sold 11 Balloons and 6 Popsicles for a total of $19.90.
```