CSCI 127, Final Practicum – May 3, 2019

Name _____

Question One. 25 points. Write the two missing functions below. Each function is passed a string of arbitrary length and should return a string that consists of every third character of the original string, starting with the first character. The function **while_loop_solution** must use a while loop to solve the problem and the function **recursion_solution** must use recursion to solve the problem. If implemented correctly, the following segment of code prints **adgjmpsvy** as both its first and second line of output.

```
word = "abcdefghijklmnopqrstuvwxyz"
result = while_loop_solution(word)
print(result)
result = recursion_solution(word)
print(result)
```

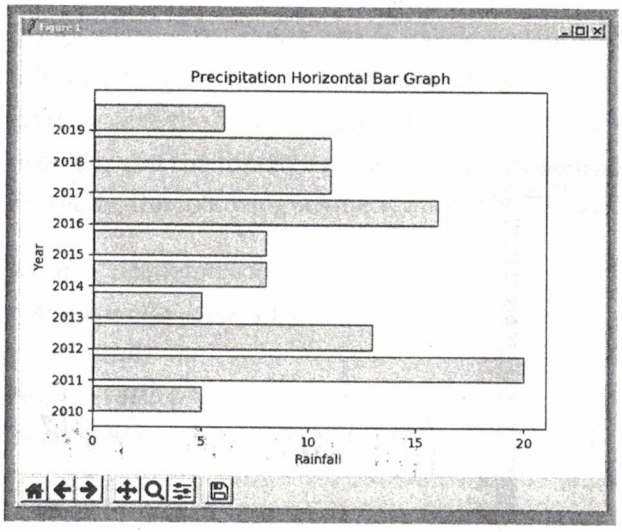
Question Two. 25 points. Write the missing function such that when the following code executes:

```
import numpy as np
rows = int(input("Enter number of rows [1-10]: "))                    # Assume the user enters a valid integer
columns = int(input("Enter number of columns [1-10]: "))              # Assume the user enters a valid integer
matrix = np.random.randint(1, 11, rows*columns).reshape(rows, columns)
print("Matrix Shape:", matrix.shape, " Matrix:\n", matrix)
result = sum_border(matrix)                                           # Write this function below
print("The sum of the numbers on the four borders =", result)
```

The following output might be produced:

```
Enter number of rows [1-10]: 3
Enter number of columns [1-10]: 5
Matrix Shape: (3, 5)  Matrix:
[[ 6 10  1  9  6]
 [ 3  1  5  1  8]
 [ 1  6  2  6  3]]
The sum of the numbers on the four borders = 61
```

Question Three. 25 points. Using only the libraries imported below, write the missing code that might produce the following figure. Generate 10 random rainfalls between the integers 5 and 20 (inclusive) that represent the rainfall for the years 2010 to 2019 (inclusive).



All bars are "gold"

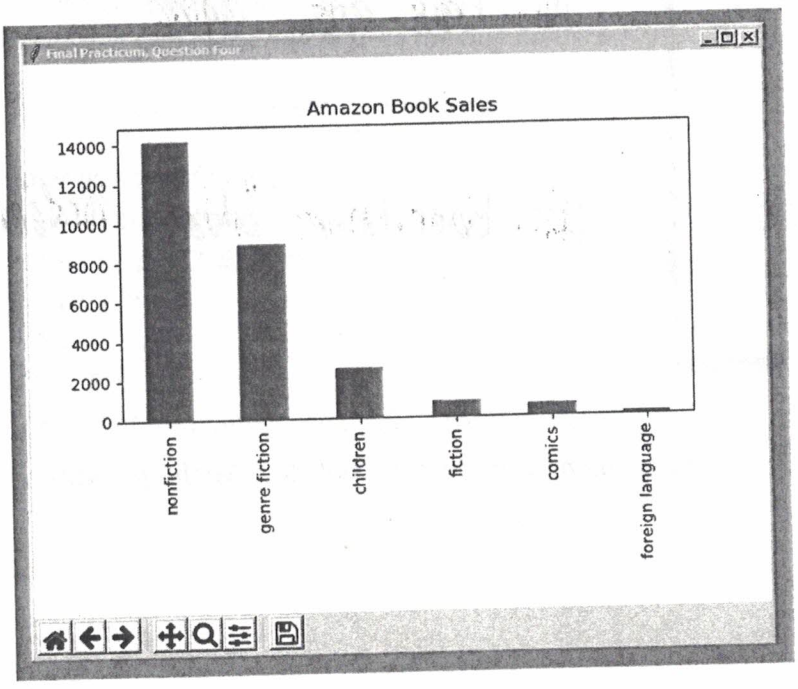
All bars have "blue" borders

import matplotlib.pyplot as plt
import numpy as np

 # Use numpy as much as possible to solve this problem

Question Four. 25 points. Using only the libraries imported below, write the missing code that produces the following figure from the **genre** column of the Publishers CSV Library, https://think.cs.vt.edu/corgis/csv/publishers/publishers.html. In addition, the average sale price of all books in the Publishers Library should be calculated using an appropriate pandas method and then printed in the Python shell as follows:

Average book sale price: $6.78



All bars are "purple"

import pandas as pd
import matplotlib.pyplot as plt

 # Use pandas as much as possible to solve this problem

This question requires Pandas...

feel free to skip over this one :)