Introduction to Computer Science and Programming

--Python--

Assignment 3

Instructions

The following assignment can be completed individually or with a partner. Each question is worth an X amount of marks and is clearly labeled. For submission you may either write it by hand and provide a hard copy of your solutions or you may type your answers. It is recommended that you type your answers as you can run the code to check if your solution is correct. This assignment is much more complicated than the ones before. Instead of putting all your code in one .py file you will now put your solution to each question in a separate .py file with the following format A3_<Question num>_<Last Name>_<First Name>.py (Ex/ A3_Q2_lam_kavan.py). Good luck.

Question 1 [5 Marks]

Write a simple class called car with a name, color and age attribute. The class should have an initializer to set the name (str), color (str) and age (str) which is given (in that order) when a car object is created. The class should also have a method which increments the car's age. Below is an example of the correct behaviour and usage.

```
car1 = car("Kia", "Red", "10")
car1.increase_age()
print(car1.age)
      >>> 11
```

Question 2 [5 Marks]

Write a class called Circle which only has a radius attribute. There should be a constructor for this class which of course sets the radius which is given by the user. Then write methods to return the area, diameter and circumference. You can name the three methods whatever you want, but ensure they are appropriate.

Question 3 [10 Marks]

Write a function that takes an open text file (in read only mode) and a string. The function can be named whatever you want. The function will search through the text file for the string. If the string is found, then the function will print to the screen the line number it is found on and also the whole line that contains the string. If the string is not found then have the function print out "The input string was not found in the provided text file."

Question 4 [5 Marks]

Implement insertion sort (to sort a one-dimensional list of numbers) as it was described in class. In what case will insertion sort have the easiest time sorting? In what case will insertion sort have the hardest time sorting?

Question 5 [10 Marks]

Write a function that takes a one-dimensional list of names (strings) and writes the names in alphabetical order to a text file called sorted_names.txt (each name should be on separate lines in the text file). How can this function help us in real life? Where in life can a function like this be used?

Question 6 [15 Marks]

Write a function that takes in a one-dimensional list of numbers that is in sorted order from least to greatest and finds a specified number in the list. In other words, your function will take in a list of numbers and a single number. The function will try to search for that number. If the number is in the list then return True else return False. For full marks your function must be the best possible solution. Hint: use the fact that the list is already in sorted order.

Question 7 [10 Bonus Marks]

Implement Merge Sort to sort a one-dimensional list of numbers. The idea behind this sorting algorithm was discussed in class. Try your best, but do not worry if you can not do this question

End of Assignment 3