CSC 120 Lab 04

**Code Refactoring exercise (**10 points)

Convert the following Python code into a function create\_list(). The function create\_list needs to return my\_list. (Watch the lectures for how to create a list or how to write a function)

import random

my\_list = []

MAX\_LEN = 50

for i in range(MAX\_LEN):

my\_list.append(random.randint(1,99))

Graphical user interface, text

Description automatically generated

**Find minimum number in a list** (15 points)

Write a Python function to get the minimum element from the list created above. For example, if you have a list [11,4,6,2,29], your code should return you 2 as that is the minimum number.

Graphical user interface, application

Description automatically generated

**Leaderboard using a List (**25 points)

\*\* Note: Read the article below on how to write pseudocode.I have provided an example of Psedocode for the maximum number finding algorithm in the Google Colab notebook. **Pseudocode writing guidelines** <https://student.cs.uwaterloo.ca/~cs231/resources/pseudocode.pdf>

Imagine you have a list ***top\_scores*** that can store only 5 numbers. Implement an algorithm in Python for storing the top 5 scores in a list. Provide the code and the algorithm in pseudocode of your algorithm. Use the following steps

* Generate 50 random numbers in a loop.
* Try to add every number to the list.
* If list size is less than 5 all numbers generated get added.
* After the list size goes above 5 and a new number is generated, it gets added if it can feature in the top 5.
* For example, if the list currently has [10,12,5,9,11] and new number generated is 42, then 42 will get added and the lowest number 5 will get replaced. so the list will be [10,12,42,9,11]. If the next number generated is 3, nothing will happen as 3 is lesser than all the numbers in the list. **This is a hard question and you will really need to try to work this out using pencil and paper before trying to implement the algorithm in Python.** But if you get it, you have made a lot of progress!
* Email me with questions or quesries.

*# Create list of 50 random numbers/”scores”*

*scores = empty list*

**for***number in range(50)*

*scores.APPEND(random integer from (1,99) # adjust score range as necessary*

LEADERBOARD(scoreList):

*INPUT: A list of scores*

*OUTPUT: A list of top 5 highest scores*

*top\_scores = empty list*

***if*** LENGTH(*top\_scores*) *< 5*

*append to top\_scores*

***else***

***if*** MINIMUM(*top\_scores) < score*

*# replace lowest score*

*minimum\_score =* MINIMUM*(top\_scores)*

*minimum\_score\_index = top\_scores.*INDEX(*minimum\_score)*

*top\_scores[minimum\_score\_index] = score*

***return*** *top\_scores*

Text

Description automatically generated

**Word Frequency Counter (**30 points)

Implement an algorithm to count the occurences of each word in the paragraph below. You can copy the text below as a string in your code. Your algorithm should be able to output all the words in the below paragraph and the count of how many times it occured in this text. For example, tech-hungry appears once in the below paragraph

**Use a dictionary as a data structure. Also use the string.split function. I will post a video on how string.split works so you need not spend time on learning how to make string,split works. Use the string provided below as the starting point. Copy all the italicized text below into your code.**

*e-wate\_paragraph= "The Global E-waste Monitor 2020 report found that the world dumped a record 53.6 million tonnes of e-waste last year equivalent to the the weight of 350 cruise ships the size of the Queen Mary 2, or enough to form a line 125 kilometres long. That's an increase of 21 per cent in five years, the report said.Just 17.4 per cent of it was recycled, meaning that an estimated $57 billion worth of gold, silver, copper, platinum and other high-value, recoverable materials used as components were mostly dumped or burned rather than being collected for treatment and reuse.China, with 10.1 million tonnes, was the biggest contributor to e-waste, and the United States was second with 6.9 million tonnes. India, with 3.2 million tonnes, was third. Together these three countries accounted for nearly 38 per cent of the world's e-waste last year. The new report also predicts global e-waste discarded products with a battery or plug will reach 74 million tonnes by 2030 almost a doubling of e-waste in just 16 years.E-waste is a health and environmental hazard because it contains toxic additives or hazardous substances such as mercury. While the overall damage done to the environment from all the unrecycled waste may be incalculable, the message from the report was conclusive. The way in which we produce, consume and dispose of e-waste is unsustainable. Global warming is just one issue cited by the report as it noted 98 million tonnes of carbon dioxide equivalents were released into the atmosphere as a result of inadequate recycling of undocumented refrigerators and air-conditioners.What is happening in India and China is symptomatic of a wider problem in developing countries where demand for goods like washing machines, refrigerators and air conditioners is rising rapidly"*

**Your answer should produde an output similar to this.**

the: 19

of: 13

and: 8

e-waste: 7 ... and so on

Text

Description automatically generated

Wasn’t sure if word frequency counter should be case sensitive or not, but made this one case sensitive (i.e. “The” and “the” are separate unique values)

**Senior Fronend Engineer Position Description  (**20 points)

Here are the questions you should try to answer

* What is your understanding of a frontend engineer?
* What skills are necessary tp become one. Dont just list the names. Describe briefly. For example learning javascript or html.
* What courses do you think cvsn help you get there?
* What are some questions that you could not understand or answer about this position.

**Bonus Questions Optional (advanced) for interested students**

* (+20) Create an algorithm to sort a list. You can use Bubble Sort , Insertion Sort or Selection Sort. Sort a list of 100000 numbers using this algorithm. Time your algorithm using the time module. Then sort this list using the inbuilt sorted() function in Python. How does the time of your algorithm compare to Python's running time.
* (+10) How do you think about the efficiency of algorithms. How do you compare two algorithms in terms of their efficiency.
* (+10) How would you implement an undo button or a back button using Stacks?
* (+10 How would you implement a queue using the list in Python?
* (+10) What is the difference between linear search and binary search?
* (+30) Do you think the top\_scores algorithm can be optimized further? If so how?

**Instructions: Upload the file with the screenshot on Blackboard with youyr firstname\_lastname.docx**