All the best, give your honest attempt

CSL 100: EndSem Exam

[60 marks, 3 hrs. duration]

General Instructions: Please write python programs for each question along with brief explanation of the variables used and the correctness of the program. Make sure you handle the exceptions and corner cases. Please answer each section separately, order doesn't matter. Please don't mix up answers from different sections.

Section A: Python Fundamentals (5 marks each question)

QA1. A Caesar cipher is a simple substitution cipher based on the idea of shifting each letter of the plaintext message a fixed number (called the key) of positions in the alphabet. For example, if the key value is 2, the word "Sourpuss" would be encoded as "Uqwtrwuu." The original message can be recovered by "reencoding" it using the negative of the key.

Write a program that can encode and decode Caesar ciphers. The input to the program will be a string of plaintext and the value of the key. The output will be an encoded message where each character in the original message is replaced by shifting it key characters in the Unicode character set.

Syntax hint: If ch is a character in the string and key is the amount to shift, then the character that replaces ch can be calculated as: chr(ord(ch) + key).

QA2. Please write a function to compute the square root of a number **'x'** using Newton's method. You may initialize with x/2 and stop when the error is less than 0.001.

$$guess = \frac{guess + \frac{x}{guess}}{2}$$

QA3. A certain CS professor gives 100-point exams that are graded on the scale 90- 100: A, 80-89: B, 70-79: C, 60-69: D, <60: F. Write a program that accepts an exam score as input and prints out the corresponding grade.

QA4. Two points in a plane are specified using the coordinates **(x1, y1)** and **(x2, y2)**. Write a program that calculates the slope of a line through two points entered by the user.

QA5. Write definitions for the following two functions:

sumN (n) returns the sum of the first n natural numbers.

sumNCubes (n) returns the sum of the cubes of the first n natural numbers.

Then use these functions in a program that prompts a user for an n and prints out the sum of the first n natural numbers and the sum of the cubes of the first n natural numbers.

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Section B: Intermediate Python (5 marks each question)

QB1. Write a class to represent spheres. Your class should implement the following methods:

__ init _ (self, radius) Creates a sphere having the given radius.

getRadius (self) Returns the radius of this sphere.

surfaceArea(self) Returns the surface area of the sphere.

volume (self) Returns the volume of the sphere

QB2. Write a function innerProd (x , y) that computes the inner product of two vectors represented as lists. The inner product of x and y is computed as:

$$x.y = \Sigma_{i=0}^{n-1} x_i y_i$$

QB3. Write a program that solves word jumble problems. Assume that a large dictionary of English words is present as a python list called *English_words*. The user types in a scrambled word, and your program generates all anagrams of the word and then checks which (if any) are in the dictionary. The anagrams appearing in the dictionary are printed as solutions to the puzzle.

Section C: Problem solving in the real-world (10 marks each question)

QC1. Write a program to keep track of conference attendees. For each attendee, your program should keep track of name, company, state, and email address. Your program should allow users to do things such as add a new attendee, display information on an attendee, delete an attendee, list the names and email addresses of all attendees, and list the names and email addresses of all attendees from a given state. The attendee list should be stored in a file and loaded when the program starts.

QC2. Write a program that simulates an automatic teller machine (ATM). Since you probably don't have access to a card reader, have the initial screen ask for user ID and a PIN. The user ID will be used to look up the information for the user's accounts (including the PIN to see whether it matches what the user types). Each user will have access to a checking account and a savings account. The user should able to check balances, withdraw cash, and transfer money between accounts. Design your interface to be similar to what you see on your local ATM. The user account information should be stored in a file when the program terminates. This file is read in again when the program restarts.

Section D: Responsibility of a computer programmer (for class participation evaluation)

Essay Topic: Based on the discussions from the class and citing various examples, please write a short essay (300 words) on the responsibilities of a computer programmer/software developer.