

CE156 COURSEWORK AUTUMN 2022

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Deadline: 12 December 11:59:59am

Introduction

You should refer to the Postgraduate Students' Handbook for details of the University policy regarding late submission and plagiarism; the work handed in must be entirely your own.

The assignment comprises five exercises. You should submit to FASER a single zip file containing (i) one .py file for each exercise and (ii) the output file produced by exercise 5.

Marking Criteria

Characteristics of an excellent project (70% or more):

- Excellent code documentation (i.e. descriptions using the “#” in your Python scripts and documentation strings for all functions)
- Excellent use of Python's native methods, code standards, standard data structures and NumPy and/or Pandas dataframes where needed
- Excellent use of relevant data types
- Follows carefully the specification provided (where applicable)
- Excellent code optimisation in terms of result/outcome production and readability
- Generally, an excellent solution, carefully worked out, producing and demonstrating clearly and correctly results/outcomes

Characteristics of a good project (60%):

- Good code documentation
- Good use of Python's code standards, standard data structures and NumPy and/or Pandas dataframes where needed
- Good use of relevant data types
- Follows the specification provided (where applicable)
- Good code optimisation in terms of result/outcome production and readability
- Generally, a good solution which produces and demonstrates correct results/outcomes

Characteristics of a fair project (50% or less):

- No meaningful code documentation
- Code tends to be lengthier and more verbose than needed, or at times difficult to read
- No real thought on the relevance of data types
- Does not follow the specification provided (results/outcomes are produced without addressing the question).
- A solution that only seems to deliver part of the results without showing some logical code developments

If you submit solutions to only some of the exercises the mark awarded will be proportional to the percentage of the assignment that has been submitted

CE156 COURSEWORK AUTUMN 2022

Exercise 1 (10%)

Write a program that asks the user to input his/her date of birth in the format dd/mm/yyyy.

If the input is not in the correct format or the date is invalid the program should output an appropriate error message. If the input is a valid date the program should calculate and output the user's age. (You will need to check whether the user has had a birthday this year e.g. someone born on 01/11/2000 will be 21 on 15 December 2022, but someone born on 25/12/2000 will still be 21.) The program should additionally output a "Happy birthday" message if it is the user's birthday today.

To calculate the age you will need to obtain today's date; to do this you need to use the line

```
from datetime import date
```

and then use `date.today()` to obtain a date object containing today's date. You can access the day, month and year of a date `d` using `d.day`, `d.month` and `d.year` (these are all integer values).

Exercise 2 (15%)

Write a function that returns a list of the prime numbers between two positive integers supplied as arguments. Use this in a program that asks the user to supply two positive integers, checks that the input is valid, then calls the function and outputs the numbers in the returned list, with 10 numbers per output line.

If the user enters negative numbers or supplies non-numeric input the program should output an appropriate error message; the two numbers should be accepted in either order. The range should be inclusive; if the user inputs 103 and 1009 (or 1009 and 103) these two numbers (which are both prime) should be included in the output.

CE156 COURSEWORK AUTUMN 2022

Exercise 3 (25%)

The three functions for this exercise should be written in a single .py file. You should not submit any code that calls the functions, although it is strongly recommended that you do produce such code in order to test your functions

- a) Write a function that takes a string as a parameter and returns `True` if and only if the string is a palindrome
- b) Write a function that takes a string as a parameter, converts the string to lower-case and returns the third most frequent letter. (If there are equally frequent letters you may return any one of the third most frequent letters.) Non-letters should be ignored.
- c) Write a function that takes a string as a parameter, counts the number of upper-case-letters, lower-case letters and digits in the string and returns a tuple containing the three counts.

Exercise 4 (25%)

Write a function that takes 2 arguments, a list of tuples and a integer denoting a salary. Each tuple in the list will contain the name, job and salary of an employee. The function should output the names and jobs of all employees in the list whose salary is greater than or equal to the integer argument. The output should be displayed one employee per line, sorted by salary (largest first), in a neatly formatted table. If there are no matches an appropriate message should be output.

Write a program that asks the user to supply a file name and attempts to open the file. Each line of the file should contain the name, job title and salary of a single employee (separated by commas). A typical line may be

```
Gareth Southgate,manager,2500000
```

The program should convert the contents of each line into a tuple with 3 elements and add the tuples to a list. (You may assume that the contents of the file are in the correct format so there is no need to perform validation). If the file cannot be opened the program should output an appropriate message and terminate.

After the input of the file contents has been completed the program should output the list of tuples (no formatting required) then enter a loop in which the user is asked to supply a salary. The user input and list of tuples should be passed as arguments in a call to the function described above. After returning from the function the user should be asked if he/she wishes to quit or to supply the name of another department.

Hint: the elements of the tuple do not have to be stored in the order described above. A different order may make the sorting easier.

CE156 COURSEWORK AUTUMN 2022

Exercise 5 (25%)

To be added to this document in week 9