ENG 5322: Computer programming class test

30th November, 2023

Instructions:

- The exam can be solved in 2 hours, 2:15pm – 4:15pm, but the deadline for submission on moodle is 5:00pm sharp, so between 4:15pm and 5:00pm start uploading the solution. Any late submissions will result in deduction of marks (except **for the case where you have disability allowance**).
- The test comprises of 3 questions with 50 marks in total.
- When finished, you must submit your complete Python notebook (.ipynb file) through the test submission page on Moodle, along with pasted solution in a word/text document.
- This is an **open lecture/lab material test** and therefore you are free to use **only** lecture and lab notes. Please do not use google, and any messenger device or phone.
- You **must not confer** with other students during the test. All exams will be thoroughly checked for plagiarism/cheating.

Good luck!

Question 1 (16 marks)
An engineer has performed various measurements on different materials with the values given as follows:

matA	[102.39, 21.34, 194.7, 215.2, 200.5, 197.3, 205.3]
matB	[65.5, 73.4, 71.2, 68.5, 75.8, 66.9]
matC	[23.4, 34.5, 23.5, 56.7, 12.3, 45.6, 27.5, 56.5, 45.5, 47.9]
matD	[110.4, 103.5, 129.4, 115.4, 123.2, 110.2, 13.4]

Create a dictionary from the above data which uses the material name as the key and the experimental data as the corresponding list. Write some code which loops over this dictionary and outputs the minimum of this list in the format where XX below are the respective values

```
Specimen: matA
Min: XX

Specimen: matB
Min: XX

Specimen: matC
Min: XX
....
```

[4 marks]

Write some code which modifies and outputs the dictionary after removing all the minimum values (e.g., the yellow highlighted numbers are removed from the list).

[4 marks]

Write some code which creates a second dictionary that comprises of the same materials but has an additional specimen, for example, “matE”. You should write the logic to populate the values for this material in a loop until the user types the word “stop”.

[4 marks]

Finally, produce a bar chart of each material type and its mean reading. Label your axes accordingly.

[4 marks]

Question 2 (17 marks)
The following program contains errors, fix them:

```
x=int(input("Enter value for x")
print("The square of x is" x*x*x)
y=input("Enter value for y")
print("The product of x and y is",x/y)
if x>y
      print("The difference is",x-y)
      else:
      print("The difference is",y-x)
x=[1,2,3]
y=[2,3,4]
z=[4;5,6]
for i,j in zip(x,y,z)
      print(i,j,k)
len('hello') = 5
ages = {
    'Phillip': 24,
    'Johny': 24,
    'Mat': 43
}
print(f'Mat is {ages["Mat]} years old.')
```

[6 marks]

Using loops, write a program that takes as an input "n" from the user and draws the 'asteriks with number' pattern:
For example, if n=4:

```
1*1
22**22
333***333
4444****4444
333***333
22**22
11*11
```

[5 marks]

Python string variable has a function isdigit() that checks whether a string variable is a digit or not. For example, running the following code

```
a='1'
print(a.isdigit())
a='blah'
print(a.isdigit())
```

produces

```
True
False
```

Using the above function, and given a list

```
mylist=['2','two','3','three','4','four']
```

Write a program that iterates through the list in a for loop and where the list element is a number (e.g., 2, 3, 4), prints it as many times, and where it is a string (e.g., two, three, four), prints "-" before and after it. The example output for the above list would then be:

```
22
-two-
333
-three-
4444
-four-
```

[6 marks]

Question 3 (17 marks)

The following are the details of five lecturers with their salary and the department they belong to:

```
Chris,25000,ENGINEERING
Liz,36000,MEDICINE
Sven,45000,ENGINEERING
Fred,11000,SOCIOLOGY
Anna,10000,SOCIOLOGY
```

Using a while True loop, the user should be able to populate the dictionary as (name:[list]) with an appropriate stopping criteria when the user types "stop". Print the final dictionary. The final dictionary should look like this:

```
{'Chris':[25000,'ENGINEERING']; 'Liz':[36000,'MEDICINE'];
'Fred':[11000,'SOCIOLOGY'];
'Anna':[10000,'SOCIOLOGY'],'Sven':[45000,'ENGINEERING']}
```

[6 marks]

Print the output of the dictionary on the screen such that the lecturers are **sorted** by salary (smallest first) in a neatly formatted (`.format()`) manner, i.e.,

```
Anna,10000,SOCIOLOGY
Fred,11000,SOCIOLOGY
Chris,25000,ENGINEERING
Liz,36000,MEDICINE
Sven,45000,ENGINEERING
```

[6 marks]

Print the total salary of each department. You should demonstrate this by having a mechanism to populate a list of all the departments, iterate through the list, have a variable to add the values, with the final output as (department names can be given in any order):

```
SOCIOLOGY,21000
ENGINEERING,70000
MEDICINE,36000
```

[5 marks]