Previous iteration – Lab Evaluation/Midterm/End Semester Questions

Question 1

The details of official and other spoken languages of our five South Indian states are given below:

1. Andhra Pradesh

   Official Languages - Telugu, English; Other spoken languages - Urdu, Hindi, Banjara, Tamil, Kannada, Marathi, Oriya

2. Karnataka

   Official Languages - Kannada, English; Other spoken languages - Urdu, Telugu, Tamil, Marathi

3. Kerala

   Official Languages - Malayalam, English, Other spoken languages - Hindi, Kannada, Tamil, Tulu

4. Tamilnadu

   Official Languages - Tamil, English; Other spoken languages - Telugu, Kannada, Urdu, Malayalam, Hindi

5. Telangana

   Official Language - Telugu, Urdu; Other spoken languages- Hindi, Tamil, Kannada, Marathi, Oriya

Store these details using appropriate data organization, and answer the following in the form of a menu-driven python program.

1. Which is the state that uses the maximum number of languages?
2. When a state name is given as additional input, list the number of spoken languages in that state, excluding official languages.
3. When a language name is given as input, display the state names where it is a spoken language and not an official language.
4. List the unique languages - a language used only in one of the states.

Input Format

For options 1 and 4 the only input is the menu choice (1, and 4 respectively).

For the second and third options, there will be two inputs - menu choice and name of the state/language separated by a comma (Eg: - 2,Tamilnadu or 3,Urdu). Please note that there is no space between the menu value and the name of the state/language in the case of options 2 and 3.

An invalid menu value (a value outside the range 1 to 4) gets the output message "Error".

Output Format

- Option 1 - State Name

- Option 2 - Count of spoken languages in the chosen state
- Option 3 - name(s) of state(s) whose spoken language list contains the given language. In the case of multiple states, the names are listed in the same line separated by a single space.
- Option 4 - names of unique languages, in separate lines
- Any other number as option - Error

Sample Input1

1

Sample Output1

Andhra Pradesh

Sample Input2

2,Kerala

Sample Output2

4

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Question 2

The Green Plantation Nursery sells the following five flower plants:-

1. Hibiscus

   Unit Price: Rs.100, Colours available: Red, White, Pink, Violet, Orange, Yellow

2. Rose

   Unit Price: Rs.200, Colours available: Red, White, Maroon, Yellow

3. Marigold

   Unit Price: Rs.50, Colours available: Orange, Yellow

4. Dahlia

   Unit Price: Rs.150, Colours available: Red, White, Pink

5. Lotus

   Unit Price: Rs.300, Colours available: Blue, Pink, Yellow

Store these details using appropriate data organization and answer the following questions using a one-time menu option.

1. Which flower has maximum colour variations?

2. Given a colour name as input, list the names of flowers which has that colour shade.

3. Given an amount as input, which all flowers can be bought such that all their colour varieties are purchased?

4. List all unique colours - a colour which is available for only one type of flower.

Input Format

For options 1 and 4 the only input is the menu choice (1, and 4 respectively).

For the second and third options, there will be two inputs - menu choice and name of the colour/budget separated by a comma (Eg: - 2,White or 3,1500). Please note that there is no space between the menu value and the name of the colour/budget in the case of options 2 and 3.

An invalid menu value (a value outside the range 1 to 4) gets the output message "Error".

Output Format

- Option 1 - Flower Name
- Option 2 - Names of flowers, for which the specified colour shade is available. If multiple flowers are available, the names are listed in the same line separated by a single space. If no such flower is available in the given colour, print "None".
- Option 3 - name(s) of flower(s) whose all colour shades can be bought with the given amount. In the case of multiple flowers, the names are listed in the same line separated by a single space. If no flowers can be bought, print the message "None"
- Option 4 - names of unique colours, in separate lines
- Any other number as option - Error

Sample Input1

1

Sample Output1

Hibiscus

Sample Input2

2,Red

Sample Output2

Hibiscus Rose Dahlia

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Question 3

FAOSTAT, the Food Agriculture Organization of the United Nations, keeps track of the production of different types of Crops worldwide. It stores the following details – Name of the crop, Type (Cereal, Vegetable, Fruit, and Nuts), and the top three largest producers (country names). The organization has approached you to do some analysis of their data. Unluckily, they do not have a soft copy of their data. You need to enter the details for N crops and find answers to the following two questions:

- Which country tops the table for the maximum number of crops?
- Given a country name, for how many crops, it appears in the top three?

Design and implement a nested list-based Python solution to read the details of N countries and answer the above questions. [10 marks] [CO2] [BTL3]

Input Format

The first input is the number of crops, N. The next 3*N inputs are the Name of the country, Type, and List of top three country names (all inputs are strings) for each crop. The last input is the country name for the second question, "For how many crops, the given country's name appear in the top three?"

Output Format

The program prints the country's name that appears in the top three for the maximum number of crops. If multiple countries satisfy the above condition, you need to print only the first country's name. The second line prints the count of crops for which the country's name appears in the top three tables.

Sample Input-Output

Sample Input	Explanation
3	Number of Crops
Millet	Name of Crop1
Cereal	Type of Crop1
[India, China, Niger]	List of top 3 countries for Crop1
Green Pea	Name of Crop2
Vegetable	Type of Crop2
[China, India, Pakistan]	List of top 3 countries for Crop2
Papaya	Name of Crop2
Fruit	Type of Crop2
[India, Brazil, Indonesia]	List of top 3 countries for Crop2
Brazil	The country's name for question 2

Sample Output	Explanation
India	India appears in Top three for all three crops
1	Brazil appears in Top 3 for Papaya alone

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Question 4

International Language Society keeps track of the following details related to each country – Name of the country, Total land area, and the number of languages used (including official and unofficial languages used in the country). The organization has approached you to do some analysis on their data. Unluckily, they do not have the soft copy of their data. You need to enter the details for N countries and find answers for the following two questions:

- Which country has the maximum number of languages?
- Which country has the highest Area/Language count ratio?

Design and implement a nested list-based Python solution to read the details of N countries and answer the above questions. **[10 marks] [CO2] [BTL3]**
Input Format
The first input is the number of countries, N. The next 3*N inputs are the Name of the country (a string), Area (a number), and Languages (another integer) for each country.

Output Format

The program prints the country's name with a maximum number of languages and the corresponding language count in the first line. The second line prints the country's name with the highest (Area / Languages) ratio. If multiple countries satisfy the above criteria, print the first country's details alone. Sample inputs and corresponding expected outputs along with explanations are provided for better understanding.

Sample Input	Explanation
3	Number of Countries
Bolivia	Name of Country1
1083300	Area of Country1
37	Languages used in Country1
Zimbabwe	Name of Country2
386850	Area of Country2
16	Languages used in Country2
India	Name of Country3
2973190	Area of Country3
20	Languages used in Country3

Sample Output	Explanation
Bolivia 37	Bolivia has maximum number of languages, and the count is 37
India	India has the highest Area/Languages ratio (29278.38 for Bolivia, 24178.13 for Zimbabwe, and 148659.5 for India)

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Question 5

A company maintains a weekly sales record to assess the profit or loss incurred for the 5 products based on the quantities sold as shown below. Based on the assessment, the quantity of the products can be updated in the forth coming weeks. Weekly sales record data for 2 weeks is entered as total number of quantities sold towards the end of the respective week. [15 marks] [CO2] [BTL3]

Product_ID={AAA,BBB,CCC,DDD,EEE}

Previous_Week_sales= {80,92,36,83,77}

Current_Week_sales= {29,64,69,83,120}

Use tuples to assign the above sales record data. Write a menu-driven python program that does the following based on the option selected.

1.   Display the contents of the tuple.

2.   Compute the difference in the sales values between Previous and Current Week and add it to a list. Finally, display the list. The difference needs to be calculated as (Current_Week_sales – Previous_Week_sales).

3.   Display the counts of products with higher, lower, and equal sales when compared to the previous week in the same line.

4.   Based on the analysis, Display whether it is a profit or loss to the company in terms of quantities sold.

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Question 6

Read the register number (3-digit integer values) and GPA (a real number between 0.0 and 10.0) for N students. Number of students (N) is accepted as an input from the user. Construct a Dictionary using register number as Key and GPA as the value. The summer internship eligibility criterion for a student is **a GPA of more than 7.** Write a menu-driven python program that does the following based on the option selected. [15 marks] [CO2] [BTL3]

1. Print the contents of the dictionary.

2. Display the count of students eligible for summer internships.

3. Print the average GPA of students who are not eligible for internship.

4. Out of all students who are not eligible for internship, display the student register number who has the least difference between current GPA and eligibility cut-off value 7.

5. Out of the Internship-eligible students, display the student register number who scored the highest GPA.

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Question 7

The following table shows the top 7 English movies as per IMDB ratings.

Movie Name	IMDB Rating	Duration in minutes	Category
Dune: Part 2	8.5	166	PG-13
Deadpool & Wolverin	7.8	128	R
Furiosa: A Mad Max Saga	7.5	148	R
Longlegs	6.7	101	R
Civil War	7	109	R
Abigail	6.6	109	R
Twisters	6.6	122	PG-13

a. Create a list of Dictionary objects, where each dictionary object is the details of a movie.

b. Compare the durations of the listed movies and print the names of the movies that are longer than two hours and 15 minutes.

c. Compare the ratings of the listed movies and print the names of the movies that have IMDB ratings greater that the combined average rating.

d. Find the category-wise average duration.

e. Find the category-wise average IMDB rating.

Question 8

The following table shows some book series details:

Book Series	Author	No of Books	Price
The Aryavarta Chronicles	Krishna Udayasankar	3	993
Harry Potter	J K Rowling	7	3499
The Ram Chandra Series	Amish Tripathi	4	1130
The Shiva Trilogy	Amish Tripathi	3	854
Percy Jackson	Rick Riordan	5	1800
Heroes of Olympus	Rick Riordan	5	1697

a. Create a dictionary object for each of the books and create a list of dictionaries.
b. Print the book series that has lesser books than the average number of books for all the book series.
c. Display Author-wise average number of books per series.
d. Print the book series names, that have a price more than the average price for all the book series.
e. Display Author-wise average price of series.

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Question 9

Oliver listens to music whenever he has free time. He tabulated his favorite 10 songs as follows:

Song	Artist	Genre	Year
Smooth Criminal	Michael Jackson	R&B	1987
Macarena	Los Del Río	Pop	1993
The rose	LeAnn Rimes	Country	1997
Dangerous	Michael Jackson	R&B, Pop	1991
They don't care about us	Michael Jackson	R&B, Pop	1995
Set Fire to the Rain	Adele	Pop	2011
Hello	Adele	Soul	2015
livin' la vida loca	Ricky Martin	Pop, Rock	1999
Shape of You	Ed Sheeran	Pop	2017
Unstoppable	Sia	Indie, EDM, Pop	2016

Based on this data, write appropriate Python code to do the following:

a. Create a *list* of *dictionaries* named *song_details*, where each *dictionary* is one song's details.
b. Create a function **Artists()** which takes *song_details* as the input, to extract the *set* of artists.
c. Create a function **popularGenres()** which takes *song_details* as the input and returns the *set* of genres. Please note that there are songs that have multiple genres associated with them.

d. In the playlist details, you can see years ranging from 1987 to 2016. Using the function **lovedDecade()** to create and return a list that contains the number of songs in each decade (1981-1990, 1991-2000, 2001-2010, 2011-2020) from *song_details*. Also, print a message to display the decade that has the maximum number of songs in Oliver's playlist.

e. Create the function **genreFrequency()**, which uses the unique set of genres received from part c, to create and return a *dictionary* that shows the count of songs that fall into each genre. The key should be the genre, and the value should be the count of songs that have the chosen genre.

f. Create a function **artistwiseGenre()** that takes *song_details*, and the list of unique artists and unique genres obtained in part b and part c respectively and creates and returns an Artist-Genre count details.

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Question 10

The following chart shows the top 9 minerals/ores mined in the world:

Mineral	Top producer	Next two	Usage in Industry/Field
Coal	China	India, US	Electricity, Heating
Iron Ore	Australia	China, Brazil	Construction, Transportation
Copper	Chile	Peru, China	Electronics, Transportation
Gold	China	Australia, Russia	Electronics, Jewellery
Silver	Mexico	China, Peru	Jewellery, Coins, Medicine
Zinc	China	Peru, Australia	Batteries, Paint, Construction
Nickel	Indonesia	Philippines, Russia	Batteries, Coins, Electronics
Lithium	Australia	China, Argentina	Batteries, Medicine
Potash	Canada	Russia, Belarus	Fertilizer

Based on the data given, write appropriate Python code to do the following:

a. Create a *list* of *dictionaries* named *mineral_details,* where each *dictionary* is a mineral's details.

b. Create a function **usedInFields()** which returns a *set* of different industries/ fields that use these minerals/ores.

c. Create a function **topCountries(),** which returns a *set* of unique country names including those among 'top producer' and 'next two' fields.

d. Write a function **mineralMapping()** which uses the set created in part c to create and return a *dictionary* with keys as country names and values as the number of minerals mined by the key country.

e. Write a function **demandingField()** which uses the *set* obtained in part b to calculate the number of minerals or ores needed by each industry. Also, print the name of the industry/field that needs the maximum number of unique minerals.

f. Create the function **countryAndFields(),** that takes the original list of dictionaries as well as the sets obtained from sub-parts b and c, returns a 'country vs industry' mapping with *Yes* or *No* against each industry, based on the minerals produced by the country and the industries using them.