1. Write a python script to implement student details using a dictionary. The roll number of the student will be the key, the value will be a list containing the name, CGPA, and mobile number of the respective student. The program should be implemented as a menu-driven program with the following menus,
   a. Insert
   b. Delete
   c. Search
   d. Exit

2. Write a program in python to perform the following.Reverse the words of the string with each word reversed.
   I/P. 'Apples are red in color'
   O/P. 'roloc ni der era selppA'

3. Write a program in python that gets an input paragraph (minimum 3 sentences)

   a.Display the length of the string and ask the user to provide a new paragraph if the length is less than 50.

   b. Display the total number of words and sentences in the paragraph

   c Make the first character of each sentence uppercase.

   c. Replace vowels with their next character. a is replaced by b, e by f etc.

   d. Replace all S or s with $

4. Write a Python program to check if a specified element presents in a tuple of tuples

   Example: Original list:
   ((Khan, Mahesh, Sarath), (Yellow, 'Pink', Orange), (Watermelon, 'Mango', 'Lemon'))
   Check if Mahesh present in said tuple of tuples!
   True
   Check if Yellow present in said tuple of tuples!
   True
   Check if Apple present in said tuple of tuples!
   False

5. An University has published the results of the term end examination conducted in April. The list of register number of students those who have got **Excellent, Good, Average** grade in Physics, Mathematics and Computer Science is available. **Note: Details of 10 students to be taken as input**

Roll No	Physics	Chemistry	Computer Science
111	Excellent/Good/Average	Excellent/Good/Average	Excellent/Good/Average
112	Excellent/Good/Average	Excellent/Good/Average	Excellent/Good/Average
to			
110	Excellent/Good/Average	Excellent/Good/Average	Excellent/Good/Average

a) Write separate functions to find the number of students who got Excellent in Physics, Good in Chemistry and Average in Computer Science.

b) Write a function to list out the register numbers of the students who secured excellent in Physics.

6.Write a Python program that defines a class Person with a constructor that takes a name and age as arguments. Create a method *greet()* that prints a greeting message including the person's name. Instantiate two objects of the class with different names and call the *greet()* method

   Expected Output:

      Hello, my name is Alice.

    Hello, my name is Bob.

7. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function *get_data()* to initialize base class data members(parameters) and another member function *display_area()* to compute and display the area of figures. Create *display_area()* as a function in parent class and redefine this function in the derived classes to suit their requirements.

Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively, and display the area.

Extend the above program to display the area of circles. This requires addition of a new derived class 'circle' that computes the area of a circle. Remember, for a circle we need only one value, its radius, but the *get_data()* function in base class requires two values to be passed.

8. Write a Python program that defines a base class *Animal* with a method make_sound() that prints a generic message like "Some sound". Then, create two derived classes *Dog* and *Cat* that override the *make_sound()* method to print "Woof" and "Meow", respectively. Create objects of both Dog and Cat, and call their make_sound() method.

  - Expected Output:

     Woof

    Meow

9. Create a class "*account*" that stores customer name, account number and type of account. From this derive the class "*current_acct*" and "*savings_acct*" to make them more specific to their requirements. So, the following operations are to be performed. Use necessary member functions according to the following operations.

Note:

1.The class *savings_acct* has private attributes *_balance* and *_account_number*. Implement methods to deposit and withdraw money while ensuring the balance cannot go negative. Also, implement a method to display the exact balance.

2. A single account holder with a unique name can have both Savings account and Current account with different account numbers. Ensure to implement this functionality

10. Write a python program for a *ZZYO* shopping mall inventory. The class *ZZYO* must have the following data members: Item number, Item name, price, discount, count, numbers sold. There are four different items present in the shopping mall The items would be added by the supervisor in the beginning of the day.

 1. Initialize all class variables value as 0 .

2. Declare a parameterized constructor that accepts itemno, item_name, price, discount, count as parameters. Use this inside all constructors.

3. Write a method *item_buy()* to buy an item. This method decrements the count value and should be updated in the "number of items sold"

4. After every 5 item sale, calculate discount. If there is no sale for an item, increase it's discount by 5% upto a maximum of 50%.

 Hint: Use a global counter. Increment it's value each time a product is sold. The number of objects must be given as input from the user and accordingly the list of objects should be maintained.

 Write a menu driven program to dynamically add and remove different items to the inventory.

Use proper naming schemes and good programming practices. Maintain proper boundary conditions.

 The menu is as follows:

 1. Set Inventory

2. Add Item

3. Remove Item

4. Buy Item

5. Exit.

10.Perform all the basic operations using *Pandas*

11. A file named 'file2.csv' contains student data. Perform all the **Data Cleaning operations** using the given 'csv' file with pandas.

12. Name of Dataset:shopping_trends.csv

1) Plot the distribution of Review ratings from the customer using a bar chart.
2) What is the average age of customers who make frequent purchases (assuming frequent purchasers are those with a count above a certain threshold is equal to 10)?

13. Name of dataset:shopping_trends.csv

3) What is the proportion of customers who used a promo code?
4) How many unique items are in the 'Items Purchased' column of the dataset?
5) What is the distribution of customer ages in the dataset? Use histogram to visualize it.

14. Classify whether a person is diabetic or not using Minimum distance classifier (Supervised Learning).

Name of CSV file:diabetes.csv

Hint: The given dataset has a column "Outcome" .For test data, the values for those columns should be removed for identifying the class labels. Later, comparison shall be performed with the given values in the 'Outcome' column.

Note:

- Outcome is the class label (1 - is diabetic and 0 - is normal.)
- **scikit-learn package or ML packages are not allowed . Utilize the other packages viz., Pandas and any Math packages.**
- Divide the data into train and test (80% and 20%)
- Classify the attributes using Minimum distance classifier and predict the outcomes on the test data

15. Perform K-means clustering for the given dataset "clustering_samples.csv".

(i) The value for *K* is 3.

(ii) The grouping of data points is to be within three clusters by followinmg K-means property.

ii) Visualization of clusters**(Bonus component)**

Note:
scikit-learn package or ML packages are not allowed . Utilize the other packages viz., Pandas and any Math packages.

16. Perform all the basic operations in NumPy.

17. The marketing team at a leading gym has been assigned to determine the typical customer profile for each of the fitness products available.
The research team plans to explore differences in customer characteristics across the different product lines.
Dataset Name: **Fitness.csv**
Data fields: Product purchased, Age in years, Gender, Education in years, Marital Status, single or partnered, usage, Fitness on 1-5 scale, Income, Miles.

Perform Correlation analysis using Pearson's coefficient on the given dataset.

18.. Generate a random data set Data=$\{x_1, \ldots, x_m\}$ for

- (a) Exponential Distribution,
- (b) Uniform Distribution (self-study),
- (c) Bernoulli Distribution.

Compute the Sample mean and variance for m = 10, 100, 500, 1000, 5000, 10000, 50000 for (a), (b), (c). This way, verify the weak law of large numbers (WLLN).

Note:

1. While generating data sets, consider the number (to be with the precision of) decimal place of 1. That is, if the random number generated is 1.4789 then consider it as 1.4.
2. You may use in-built functions/libraries to generate samples from desired underlying distributions.
3. In Problem 1, the plot's x-axis should be the sample size m and the y- axis should be the sample mean.

19. Perform KNN algorithm on the given dataset using scikit learn pakages.

Dataset Name diabetes.csv

20. Use this dataset for KNN Classification
Dataset Name shopping_trends.csv

21. Identify the most suitable independent variable and perform linear regression on the given dataset and predict the value of mpg(miles per gallon)

Dataset Details(auto_mpg.csv):

The dataset consist of 398 rows and 9 features representing the technical specifications of cars

Lab 2

1. Write a program to find the factorial of a number n.
2. The Head Librarian at a library wants you to make a program that calculates the fine for returning the book after the return date. You are given the actual and the expected return dates. Calculate the fine as follows:

a. If the book is returned on or before the expected return date, no fine will be charged, in other words fine is 0.

b. If the book is returned in the same month as the expected return date, Fine = 15 Rupees × Number of late days.

c. If the book is not returned in the same month but in the same year as the expected return date, Fine = 500 Rupees × Number of late months

d. . If the book is not returned in the same year, the fine is fixed at 10000 Rupees.

3. Write a program that read a group 'g' of five numbers and another number 'n' and print a number in 'g' if it is a factor for a given number n?

4. Your teacher has given you the task to draw the structure of a staircase. Being an expert programmer, you decided to make a program for the same. You are given the height of the staircase. Given the height of the staircase, write a program to print a staircase as shown in the example.

For example, Staircase of height 6:

```
#
##
###
####
#####
```

Boundary Conditions: height >0

5. Given marks secured in CSE1001 by the students in a class, design an algorithm and write a Python code to determine the class average. Print only two decimal digits in averag

Input	Processing	Output
Number of students in class, mark scored by each student	Determine total of marks secured by students Find average of marks	Class average of marks

6. Get the quantity of items purchased and their prices from 5 users in lists as follows Quantity=[Q1,Q2....Q5] Price= [p1, p2...p5].

a) Compute the prices of the items purchased and return the answer as a single tuple. Total amt= (TP1, TP2, TP,3, TP4, TP5). Where TP=Total amount of each person. (Quantity * Price)

b) Compute the total amount purchased by all the five users.

Objective: To crate tables and do some basic operations on it using pandas library

I)   Create a csv file using python script with the following content

SBIAccountHolder.csv

Name	Account Number	Account Type	Adhaar_No	Balance
Ram	9893893891	SB	959389389173	8989839
Sam	9893893898	CA	959389389179	7690990
Prabhu	9893893871	SB	959389389159	989330

Write Menu driven program to support the following functionalities

1) Append record(row) of account holder
2) Delete Record, given the account number
3) Credit: Ask the user to enter amount to be credited, and then add it to the balance
4) Debit: Ask the user to enter amount to be debited, say x, and then subtract it from the balance. In case of SB account type, debit operation should report an error if balance – x <0
5) Print_account details given the account number
II)   Create another csv file with the following table using python script
      Aadhar_DB.csv

Name	Adhaar Number	Contact_No	DOB	Address
Ram	959389389173	9840787333	12-2-1990	No 23, Kandigai, Chennai 127
Sam	959389389179	9840787343	12-2-2000	No 73, Melakottaiyu, Chennai 127
Prabhu	959389389159	9840787353	12-2-2010	No 43, Anna Nagar, Chennai 102

Create a new csv file, merging the tables given in I) and II)

Note:

After each operation done on the table(DataFrame), table should be converted into csv file with the same name