Assignment

1. Write a program to display first N natural numbers.

2. Write a program to accept 10 numbers – check whether each number is divisible by 10 – count the numbers that are divisible and not divisible by 10 – display respective counts at the end.

3. Write a program to read a number and print the multiplication table.
   Ex: Enter the number: 5
   ```
   5 * 1 = 5
   5 * 2 = 10
   …
   …
   5 * 10 = 50
   ```

4. Write a program to print the Fibonacci Series upto length n (read the length form input).

5. Write a program to find the sum of digits in a number.

6. Write a program to compute the factorial of a given number and print it in reverse order.

7. Write a program to check whether the number entered is a Prime Number or not.

8. Write a program to check whether the number entered is an Armstrong Number.

9. Write a program to print the following pattern for a given n.
   Ex: Enter n value: 4
   ```
   1
   2  3
   4  5  6
   7  8  9  10
   ```

10. Write a program to print the following pattern for a given n.
    Ex: Enter n value: 4
    ```
      1
    ```

```
  0 1
 1 0 1
0 1 0 1
```

11. Write a program to read the weight of the check-in luggage and calculate the charges for overweight that exceeds the permissible limit 25kg at the rate of 2,500/- per 5kg thereafter. The weight is rounded off to next multiple of 5 if the fracton is more than 2.5 kg or to previous next multiple of 5 if the fracton is less than 2.5 kg.

Sample Test Cases:

```
Enter the luggage weight: 27kg
Over weight charges are: 0/-
Enter the luggage weight: 29kg
Over weight charges are: 2,500/-
Enter the luggage weight: 56kg
Over weight charges are: 1500/-
```

12. Write a program to read the temparature and find out the season based on following ranges.

Seasons	**Av. Temp (Min-Max)**
Winter	5° to 25°
Spring	20° to 25°
Summer	25° to 48°
Monsoon	30° to 35°

Sample Test Cases:

```
Enter the temparature: 36
Season is Summer

Enter the temparature: 24
Season is either Winter or Spring
```

13. Write a program to read a person's work hours for the week and regular hourly wage, calculate the total pay for a given week. Hours worked over 40 are considered as overtime and paid at 1.5 times the normal rate.

14. Write a program to convert a numerical grade to a letter grade with following cutoffs.

'A' - 90 and above
'B' - 80 to 89
'C' - 70 to 79
'D' - 60 to 69
'E' - 50 to 59

‘F’ - below 50

List,Tuple,Dict

1. Write a program to read n values from user, add to a list and print them on screen.

2. Write a program to find second smallest and second largest numbers in a given list.

3. Write a program to find the frequencies of each number in a list and print numbers with second highest and second lowest frequency.

4. Write a program to swap consecutive elements in a list.
   Ex: Input: [1,2,3,4,5,6,7,8]   Input: [1,2,3,4,5,6,7]
   Output: [2,1,4,3,6,5,8,7]   Output: [2,1,4,3,6,5,7]

5. Write a program to Concatenate two lists into a new list such that alternate elements form two lists are placed in the new list.
   Ex-1: Input: list1 = [1,2,3,4,5,6,7,8], list2 = [11,12,13,14,15,16,17,18]
   Output: [1,11,2,12,3,13,4,14,5,15,6,16,7,17,8,18]

   Ex-2: Input: list1 = [1,2,3,4,5], list2 = [11,12,13,14,15,16,17,18]
   Output: [1,11,2,12,3,13,4,14,5,15,16,17,18]

6. Write a program to search for a given number in a list and print its position. If the number occurs more than once, print the last position.

7. Write a program to find the intersection of two given lists.

8. Write a program to remove(keep one copy) the duplicates from the given list (use in place approach).

9. Write a program to swap the elements of a list before and after a pivot element. Read a list and an index. In the new list all the elements left to the index appear to its right and vice versa.
   Ex: list = [1,2,3,4,5,6,7,8], index = 3
   Modified list = [5,6,7,8,**4**,1,2,3]

10. Write a program to search for an element(key) in the given list using binary search approach.

    In binary search, first we match the middle element with the key and if it founds to be less than the middle element, search continues in the left half of the list using same approach, otherwise in the right half until the index of the element is found or there are no more elements left to match, whichever is earlier. Assume the the values in the array are in increasing order.

Ex: Input: [1,2,3,4,5,6,7], key = 5

First match is with 4 (middle index 3), key > middle value

Second match is with right sub list [5,6,7], match 5 with 6[middle element], key < middle value

Third match is with left sub list [5], match 5 with 5, match is found and index 4 is printed.

11. Write a program using tuples to count the number of occurrences of days in a week from a given string.

    Note: Read the input as single line(string) without any separators and parse it.

    Ex: input = MonTueTueWedThuFriFriSatMonFriWed

    Output:
    Mon – 2
    Tue – 2
    Wed – 2
    Thu – 1
    Fri – 3
    Sat – 1
    Sun – 0

12. Write a program to accept n integers from the user, store them in a tuple and find the second maximum and second minimum element.

    Note: read values into a list and convert it into tuple.

13. Write a program to find the average and sum value of the numbers in a given tuple of n tuples.

    Note: Read the input as line(string) and parse it into tuple of n tuples based on parentheses.
    Input: ((10, 10, 10, 12), (30, 45, 56, 45), (81, 80, 39, 32), (1, 2, 3, 4))
    Here n = 4.
    Output:
    Tuple 1: Sum is 42 and Average is 10.5
    Tuple 2: Sum is 176 and Average is 44.0
    Tuple 3: Sum is 232 and Average is 58.0
    Tuple 4 Sum is 10 and Average is 2.5

14. Write a program to create two sets from a list of items and find out the identical items.

    Note: Read n values from user and add them to a list. Split the list into two sets of size n/2 or n/2 and n/2+1.

15. Write a program using sets to solve the following problem.

    Assume there are two subjects with m & n number of registered students respectively. Write a program to read the names of those students and find the following

    a. find the list of students who registered for only one subject
    b. find the list of students who registered for both the subjects
    c. find the list of students only registered for first subject
    d. find the list of students only registered for second subject

16. Write a program to read two strings and print a new string which contains all uncommon characters from both the strings.

    Ex: String 1: HellO
    String 2: Hihello
    Output: Oiho

17. Write a program to check whether a given string is pangram or not.

    Note: A string is a pangram if it contains all 26 English alphabets(case insensitive).

18. Write a program to find all possible permutations of a given set of numbers.

    Note: Input size is <= 4
    Ex: Input 1,4,5
    Output:
    1,4,5
    1,5,4
    4,1,5
    4,5,1
    5,1,4
    5,4,1

19. With a given integral number n, write a program to generate a dictionary that contains (i, i*i) such that is an integral number between 1 and n (both included). and then the program should print the dictionary.

    Suppose the following input is supplied to the program:
    8
    Then, the output should be:
    {1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64}

20. Write a program to read a sentence (string) and build a dictionary out of it using following approach.

    a. Each word in the sentence becomes a key and every other word that immediately follows it is the value.
    b. If same word appears multiple times in a sentence, key remains same and value contains a list of words that appear next to that key in the given sentence.
    c. Last word in the sentence contains empty value unless it appears elsewhere in the sentence.

Ex: Sentence is “Hi, how are you?”
Dictionary is {“Hi,” : [“how”], “how”: [“are”], “are”:[”you?”], “you?”: []}

Your program should read a sentence and print the dictionary.

21. Write a program to read text from input and build the dictionary of words(keys) and their frequencies(value). Print the list of words that appeared more than 2 times.

22. Write a program to merge the dictionaries built in programs 2 and 3 into a single dictionary and print it. Note: value in new dictionary contains a nested list.

23. Define a function to implement binary search on a given list. Function takes two parameters search_key and search_list as given below. Your program should read a list of values(numbers or strings) and a key from input and print the index of the key if found otherwise -1. Note: sort the list in increasing order before passing it to binary_search.

    binary_search(search_key, search_list)

24. Write a program to define three functions read_stock, read_shopping_list and compute_bill which does following tasks.

read_stock: reads a list of items(name, quantity available and unit price) and builds a nested dictionary(name is the key and other details are embedded in a dictionary). Function returns the stock dictionary.

```
Ex: stock = { “apple” : {“name” : “apple”, “available_quantity”: 10, “unit_price”: 20},
              “orange” : {“name” : “orange”, “available_quantity”: 5, “unit_price”: 15},
              ……………..,
              ……………..,
              “banana” : {“name” : “banana”, “available_quantity”: 50, “unit_price”: 5
          }
```

read_shopping_list: reads a list of items(name and quantity required) from user and builds a dictionary of shopping list and returns it.

Ex: shopping_list = { “apple” : 5, “orange” : 3, “banana” : 20}

compute_bill: takes stock and shopping_list as parameters and computes total bill amount. It also updates the stock dictionary when a purchase is successful. Returns the final bill amount.

Total bill is 100 + 45 + 100 = 245

Updated stock is given below

```
stock = { “apple” : {“name” : “apple”, “available_quantity”: 5, “unit_price”: 20},
          “orange” : {“name” : “orange”, “available_quantity”: 2, “unit_price”: 15},
                        ……………..,
                        ……………..,
                “banana” : {“name” : “banana”, “available_quantity”: 30, “unit_price”: 5}
            }
```

Note: If a requested item is not available in the stock, mention that in the output as below.

If an item is not listed in the stock : “Item(name) is not available at the store”

If item is listed and its available_quantity is zero : “item(name) is out of stock”

If item is listed and its available_quantity is less than requested quantity : “item(name) is available less in quantity (requested : x, available: y)

ex: If user requests 10 oranges, the message should be “orange is less in quantity (requested : 10, available: 5)

and ask the user if purchase should be made or not?

If yes, then compute the bill against the available quantity for the given item.

a. Define above three functions and write a main function to read, compute and print the shopping information by calling appropriate functions.
b. Define a function to add an item to the stock list.
c. Define a function to update the details (available_quantity, unit_price) of an item in the stock list.
d. Modify the existing stock list using above two functions.

File Handling

1. Write a program that writes 10 random numbers to a file 'numbers.txt'. Each random number should be in the range of 1 through 100.

2. Write a program that reads and display all of the numbers stored in the file numbers.txt (created in question 1) and calculates their total.

3. Write a function, digit_count() in Python that counts and displays the number of digits in the text file named 'sample.txt'. For example, if the content of 'sample.txt' is as follows :

The team achieved a milestone in 2023. They completed a multi-million-dollar project ahead of schedule. Stakeholders were impressed with a 98% success rate.

The function should display the output as 6

4. Write a function lines_count() that reads lines from a text file named 'zen.txt' and displays the lines that begin with any vowel. Assume the file contains the following text and already exists on the computer's disk:

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated.

The lines_count() function should display the output as:
Explicit is better than implicit.

5. Assume that the file 'notes.txt' containing some text and exists on the computer's disk. Write a program that display only those words from 'notes.txt' file whose length is more than seven. Keep in mind that any punctuation marks at the beginning or end of a word should also be considered as part of the word's length.

6. Write a function last_digit_words() in Python to count the words ending with a digit in a text file "notes.txt". For example, if the file content is as follows :

The Computer6 hums softly as I sit with a Book3 in hand, diving into a world of imagination. Outside, my friends gather at House9 and I quickly grab my Pen2 to jot down the address.

The expected output should be:
Number of words ending with a digit are 4

7. Assume that a file 'names.txt' containing a series of names (as strings) exists on the computer's disk. Write a function, first_five() that displays only the first five lines of the file's contents. If the file contains less than five lines, it should display the file's entire contents.

8. Write a Python program that reads a text file and prints its contents in reverse order (from the last line to the first line).

9. Write the definition of a Python function named long_lines( ) which reads the contents of a text file named 'lines.txt' and displays those lines from the file which have at least 8 words in it. For example, if the content of 'lines.txt' is as follows :

Flat is better than nested.
Sparse is better than dense.
Readability counts.
Special cases aren't special enough to break the rules.

The output should be:
Special cases aren't special enough to break the rules.

10. Assume that a file named 'feedback.txt' contains student feedback in the following format:

Positive: Saksham improved grades, more confident now.
Negative: Arav needs better time management for coursework.
Negative: Samar should work on communication in group activities.
Negative: Soham could benefit from asking more questions in class.
Positive: Sakshi excels academically, a great team player.

Write a Python function named feedback_analysis() to calculate and display the following information:
Total feedbacks stored in the file.

Count of positive feedbacks.
Count of negative feedbacks.

11. Create a Python function make_copy() that reads a text file 'input.txt' and writes its contents to a new file 'output.txt', capitalizing the first letter of each word. For example, if 'input.txt' contains the following content:

"In the world of programming, there are no limits to what you can achieve. Aim high!"
The 'output.txt' should contain:
"In The World Of Programming, There Are No Limits To What You Can Achieve. Aim High!"