Assignment 6

1. Write a Python program to calculate the area of a circle given the radius. Use the formula πr² for the area, where r is the radius. Test your program with a radius of 5 units.

2. Implement a function in Python that takes a list of integers and returns the index of the maximum element in the list. If there are multiple maximum elements, return the index of the first one found. For example, if the input list is [3, 7, 1, 9, 2], the function should return 3 (since 9 is the maximum element).

3. Create a program that generates a random password of length 8 characters. The password should contain uppercase letters, lowercase letters, digits, and special characters. Ensure that the password is not reusable.

4. Develop a program that reads a file containing a list of student grades (in percent) and calculates the average grade. The program should also determine the highest and lowest grades. Assume the file contains one grade per line.

5. Write a Python script to analyze the sentiment of tweets using the TextBlob library. The script should take a list of tweet URLs as input and return a list of sentiment analysis results (positive, negative, neutral) for each tweet.

6. Implement a function that takes a string and returns the string with all vowels removed. For example, if the input is "Hello World", the output should be "Hll Wrld".

7. Design a game using Python that simulates a simple rock-paper-scissors game. The game should allow two players to play against each other, with the winner being the first to reach a predetermined number of points.

8. Create a program that implements a basic calculator capable of performing addition, subtraction, multiplication, and division. The program should read two numbers and an operation symbol as input and return the result of the operation.

9. Develop a Python script that checks if a given string is a palindrome. A palindrome is a string that reads the same backward as forward. The script should ignore case sensitivity and spaces.

10. Write a program that reads a list of names and ages from a file and prints them in the format "Name: [Name], Age: [Age]". Assume the file contains one name and age per line, separated by a comma.

11. Create a program that simulates a simple bank account with methods to deposit, withdraw, and display the current balance. The program should also handle cases where the withdrawal is greater than the balance.

12. Implement a Python script that reads a file containing a list of words and counts the occurrences of each word. The script should then display the words along with their counts in descending order.

13. Design a program that finds the common elements between two lists of integers. The program should return a list of the common elements without duplicates.

14. Write a Python program that checks if a given string is a valid URL. The program should use regular expressions to validate the URL format.

15. Create a calculator that can perform logarithmic calculations. The program should accept two parameters: a base and a number. It should return the logarithm of the number with respect to the given base.

16. Develop a program that reads a list of email addresses and checks if they are valid. Use regular expressions to validate the email format.

17. Write a Python script that reads input from the user and checks if the input is a valid date in the format YYYY-MM-DD. The script should handle leap years and invalid dates.

18. Create a program that takes a list of integers and returns a new list containing only the elements that are multiples of 3.

19. Implement a function that takes a list of lists (representing a 2D grid) and returns the maximum sum of any subgrid of size 2x2. A subgrid is a 2x2 area within the grid.

20. Write a Python program that reads a file containing a list of numbers and calculates the factorial of each number. The program should handle cases where the input is not a positive integer.