Program Set 6

Dates: 19.12.2022 – 23.12.2022

NOTE: GIVE PROPER COMMENTS, PROMPTS AND CUES FOR ALL CODES.

1. Write a program in C to swap two numbers using function.
    a. Use call by reference
    b. Use call by value
    c. Do not use a third variable
2. If a five-digit number is input through the keyboard, write a program to print a new number by adding one to each of its digits. For example, if the number that is input is 12391 then the output should be displayed as 23402.
3. A five-digit number is entered through the keyboard. Write a program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not (palindrome).
4. Given the coordinates (x, y) of a center of a circle and it's radius, write a program which will determine whether a point lies inside the circle, on the circle or outside the circle.
5. Any year is entered through the keyboard, write a program to determine whether the year is leap or not.
6. Any character is entered through the keyboard, write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII Values
A – Z	65 – 90
a – z	97 – 122
0 – 9	48 – 57
special symbols	0 - 47, 58 - 64, 91 - 96, 123 - 127

7. Using conditional operators determine:
    a. Whether the character entered through the keyboard is a lower case alphabet or not.
    b. Whether a character entered through the keyboard is a special symbol or not.
8. Write a program to print all the ASCII values and their equivalent characters using a while/for/do-while loop. The ASCII values vary from 0 to 255.
9. Write a program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

a. There are 21 matchsticks.
b. The computer asks the player to pick 1, 2, 3, or 4 matchsticks.
c. After the person picks, the computer does its picking.
d. Whoever is forced to pick up the last matchstick loses the game.

10. Write a program to enter the numbers till the user wants and at the end it should display the count of positive, negative and zeros entered.
11. Show the difference between a static and an automatic variable using a user defined function.
12. We are given eight integers in the input to a C program, out of which only one is distinct. We wish to print the value of the unique distinct integer and determine the variable in the input order corresponding to the distinct value. Use a single scanf statement to read all the eight integers, say, a; b; c; d; e; f; g and h. Do not use arrays/recursion. For example, if the sequence is 1 1 1 1 1 2 1 1 then we must print that the 6^{th} element of value 2 is the unique distinct value.
13. Write a C program to read in a positive integer n and the digit which occurs the maximum number of times in n along with its frequency. For example, if the input is 567755, then the answer is 5 and its frequency is 3. Do not use arrays.
14. Call a number curious if it is divisible by its most significant digit (leftmost non-zero digit). For example, 489 is not divisible by 4 and hence is not curious. On the other hand, 488 is curious as it is divisible by 4. Write a C program that reads two integers a; b with 0 < a < b and prints all curious numbers in the range [a; b].
15. Write a program that reads three points, (x1; y1), (x2; y2), and (x3; y3) and determines whether they represent the vertices of a right-angled triangle. If so, the program must identify the hypotenuse, and print the value of one of the angles in radians.
16. Write a program that continuously prompts the user for a value of money in INR until the user enters 0. Pass each entered amount to a conversion function that calculates the number of 2000s, 500s, 200s, and 100s, 10s, 5s, 2s and 1s are needed.
17. Write a program that continuously prompts a user for an integer value until the user enters 0. Print outputs from main(). The application passes the value in turn to the following methods:
    a. A method that displays all whole numbers from 1 up to and including the entered number
    b. A method that computes the sum of all the whole numbers from 1 up to and including the entered number
    c. A method that computes the product of all the whole numbers from 1 up to and including the entered number
    d. One function which calculates all three – print results from main().
18. Write a C program which will take an integer as input and will contain the following functions:

a. A function to determine the proper divisors of the input number. The proper divisors of the integer n are the positive divisors of n other than n itself. The proper divisors of 27 are 1, 3 and 9.
b. Use the previous function to write a function which will determine if the original input number is a *perfect number* or not. A perfect number is a positive integer that is equal to the sum of its proper divisors. The smallest perfect number is 6, which is the sum of 1, 2, and 3. Other perfect numbers are 28, 496, and 8,128 etc. Print results from main().