Constants, Variables, and Data Types; Operators and Expressions; Managing Input and Output Operations:

1. Write a program to calculate the average of a set of N numbers taken from user?
2. Write a program to implement the temperature conversion system (Fahrenheit to Celsius and vice versa)?
3. Write a program to determine and print the sum of the following harmonic series for a given value of n: $1 + ½ + 1/3 + \ldots + 1/n$
4. Write a program that prints the odd and even numbers from 1 to 100?
5. Write a program that will take the length and width of a rectangle from the user and compute its area and perimeter?
6. Given an integer number 5678. Write a program that displays the number as follows:

    5 6 7 8
    6 7 8
    7 8
    8

7. Write a program to read a four digit integer and display the sum of its digits?
8. Write a program to read two integer values m and n and to decide and print whether m is a multiple of n?
9. Write a program to read three values from terminal and print the following results:
    a. Sum of the values
    b. Average of the three values
    c. Largest of the three
    d. Smallest of the three
10. Write a program that determines whether a given integer is odd or even and displays the number and description on the same line?

Decision Making and Branching; Decision Making and Looping:

11. Write a program to evaluate the power series: $e^x = 1 + x + x^2/2! + \ldots + x^n/n!$
12. Write a program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7
13. Write a program to print the Floyd's triangle?
14. Write a program to produce the following form of Floyd's triangle:

    1
    0 1
    1 0 1
    0 1 0 1
    1 0 1 0 1

15. Write a program to compute the real roots of a quadratic equation: $ax^2 + bx + c = 0$
16. Write a program to evaluate the equation $y = x^n$, when n is a non-negative integer?

17. Write a program to print the multiplication table from 1x1 to 10x10?
18. Write a program using while loop to reverse the digits of a five digit number taken from user?
19. Write a program that compute and print the factorial of a given integer n?
20. Write a program to display the first n Fibonacci numbers?
21. Write a program to evaluate the investment equation $V = P(1+r)^n$, for various combination of the following values of P, r and n:

    P : 1000, 2000, . . . , 10000

    r : 0.10, 0.11, 0.12, . . . , 0.20

    n : 1, 2, 3, . . . , 10
22. Write a program to compute the value of Euler's number e using the following formula:

    $e = 1 + 1/1! + 1/2! + . . . + 1/n!$
23. Write a program to evaluate sin(x) and cos(x) functions?

Arrays; Character Arrays and Strings:

24. An election is contested by 5 candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and count the votes cast for each candidate using an array variable count. In case, a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballots.
25. Write a program to calculate the elements of the Pascal Triangle for 10 rows and print the results.
26. Write a program to read the data of 100 students for 3 subjects and determine the following:
    a. Total marks obtained by each student
    b. The highest marks in each subject and the Roll No. of the student who secured it
    c. The student who obtained the highest total marks
27. Given are two one-dimensional arrays A and B which are sorted in ascending order. Write a program the merge them into a single sorted array C that contains every item from arrays A and B, in ascending order.
28. Write a program that will read the values of elements of matrices A and B and produce the product matrix C.
29. Write a program that fills a 5x5 matrix as follows:
    a. Upper left triangle with +1s
    b. Lower right triangle with -1s
    c. Right to left diagonal with zeros
30. Write a program to do the following :
    a. To output the question "who is the inventor of C"
    b. To accept an answer
    c. To print out "good" and then stop, if the answer is correct
    d. To output the message "try again", if the answer is wrong
    e. To display the correct answer when the answer is wrong even at the third attempt and stop.
31. Write a program which will read a text and count all occurrences of a particular word.
32. Write a program which will read a string and rewrite it in the alphabetical order.

33. Write a program that reads a string from the keyboard and determines whether the string is a palindrome or not. (a string is a palindrome if it can be read from left and right with the same meaning. For example, madam and anna are palindrome strings)
34. Write a program that reads the cost of an item in the form TTTT.PP (where TTTT denotes Taka and PP denotes Paisa) and converts the value to a string of words that expresses the numeric value in words.
35. Given a string,

    char str[] = "123456789";

    write a program that displays the following:

    ```
        1
       2 3 2
      3 4 5 4 3
     4 5 6 7 6 5 4
    5 6 7 8 9 8 7 6 5
    ```

User Defined Functions:

36. Write a function **exchange** to interchange the values of two variables, say x and y. Assume that x and y are defined as global variables?
37. Write a recursive function that will generate and print the first n Fibonacci numbers?
38. Write a function **prime** that returns 1 if its argument is a prime number and returns zero otherwise?
39. Write a function that will scan a character string passed as an argument and convert all lowercase characters into their uppercase equivalents?
40. Write a function that can be called to compute the product of two matrices of size m by n and n by m. The main function provides the values for m and n and two matrices?

Structures and Unions:

41. Define a structure to represent a vector (a series of integer values) and write a modular program to perform the following tasks:
    a. To create a vector
    b. To modify the value of a given element
    c. To multiply by a scalar value
    d. To display the vector in the vector form

    Add another function to the program that accepts two vectors as input parameters and return the addition of two vectors?

42. Define a structure called **cricket** that will describe the following information:
    a. Player Name
    b. Team Name
    c. Batting Average

Using **cricket**, declare an array player with 50 elements and write a program to read the information about all the 50 players and print a team-wise list containing names of players with their batting average?

43. Define a structure data type named **date** containing three integer members **day**, **month** and **year**. Develop an interactive modular program to perform the following tasks:
    a. To read data into structure members by a function
    b. To validate the date entered by another function
    c. To print the date in the format **April 29, 2010** by a third function

    Design a function **update** that accepts the date structure to increment the date by one day and return the new date. The following rules are applicable:

    a) If the date is the last day in a month, month should be incremented
    b) If it is the last day in December, the year should be incremented
    c) There are 29 days in February of a leap year

    Add another function called **nextdate** to perform the following tasks:

    a) Accepts two arguments, one of the structure data containing the present date and the second an integer that represents the number of days to be added to the present date
    b) Adds the days to the present date and returns the structure containing the next date correctly

Pointers:

44. Write a program using pointers to read in an array of integers and print its elements in reverse order?
45. Write a function using pointers that receives a sorted array of integers and an integer value, and inserts the value in its correct place?
46. Write a function using pointers to add two matrices and to return the resultant matrix to the calling function?
47. Write a function using pointers that receives a character string and a character as argument and deletes all occurrences of this character in the string. The function should return the corrected string with no holes?

File Management:

48. Write a program to copy the contents of one file into another?
49. Write a program that requests for a file name and an integer (offset value). The program then reads the file starting from the location specified by the offset value and prints the contents on the screen?
50. Write a program that reads a file containing integers and appends at its end the sum of all the integers?