Problem Set (Practice)

Set-1:

1. A program that takes input a number **n** and determines whether **n** is a prime number or not.

   Note: Prime number is an integer that has no integral divisors but itself and 1. For example, 17 is a prime number.

2. A program that takes input a number **n** and gives as output all the prime numbers from 1 to **n.**

3. A program that takes input a number **n** and determines whether **n** is a perfect number or not.

   Note: a perfect number is a positive integer that is the sum of its proper positive divisors, that is, the sum of the positive divisors excluding the number itself. For example, 6 is a perfect number since 6=1+2+3

4. A program that takes input a number **n** and gives as output all the perfect numbers from 1 to **n.**

5. A program that takes input a number n and gives as output the first **n** Fibonacci numbers. Fibonacci number is defined by F(n)=F(n-1)+F(n-2), where F(0) = F(1)=1

6. Take an integer **n** as input and find out the summation of all the digits of the number.

   Example: input: 3867 output: 24

7. Take an integer n as input and find out the summation of all the digits until the output is not a single digit.

   Example: input: 3867 output: 6

8. Calculate the factorial of a number **n**
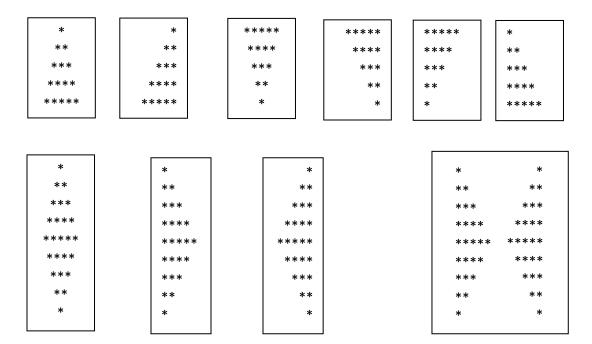
9. Write a program to reverse the digits of the number.

   Example: input: 23829 output: 92832

10. Write a program to convert decimal number to binary and vice versa.

11. Write a program to determine whether a year is leap year or not.

12. Write a program to convert Celsius, Fahrenheit and Kelvin from one to other.

13. Write a program that will take input an integer **n** (1 ≤ **n** ≤9) and gives output like followings. In the following examples **n**=4

```
1                    1                    1
1 2                 1 2                  1 2
1 2 3              1 2 3                1 2 3
1 2 3 4          1 2 3 4              1 2 3 4


1                    1                    1
2 2                 2 2                  2 2
3 3 3              3 3 3                3 3 3
4 4 4 4          4 4 4 4              4 4 4 4
```

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

14. Write a program that will take input an integer **n** and gives output like followings. In the following examples **n**=5

```
    *              *         *****      *****      *****      *
   **             **         ****       ****       ****      **
  ***            ***         ***        ***        ***       ***
 ****           ****         **         **         **        ****
*****          *****         *          *          *         *****
```

```
    *           *              *              *         *
   **          **             **             **        **
  ***         ***            ***            ***       ***
 ****        ****           ****           ****      ****
*****       *****          *****          *****     *****
 ****        ****           ****           ****      ****
  ***         ***            ***            ***       ***
   **          **             **             **        **
    *           *              *              *         *
```

15. Take two matrixes as input and calculate their sum, difference and multiplication matrix.

16. Take a matrix as input and determine its determinant.

17. Take n numbers and sort the numbers in ascending/descending order.

18. Solve the equation $ax^2+bx+c=0$, take **a, b, c** as input.

19. Solve the equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$, take $a_1, b_{1,c1}, a_2, b_2, c_2$ as input

20. Two dates are given. Find out difference between them.

Set-2:

1. A calculator that converts number from any base to any other base.

2. A calculator to add, subtract and multiply two numbers in any base.

3. Month and Year will be given. Show the calendar of the month of the year. (Tips: take 1st January, 2000 as reference, find out the first day of the year and then find out the first day of the month, then show the calendar of the month)

4. Universal Converter with following features

   a) Temperature (Celsius, Fahrenheit, Kelvin, …)

   b) Length (meter, feet, inch, mile, …)

   c) … … …

5. Geometric calculator. Find area, volume, perimeter etc.(options will be given where it is applicable) for the following:

   a. Circle

   b. Cube

   c. Cone

   d. Trapezoid

   e. Rectangle

   f. Ellipse

   g. Box

   h. Sphere

   i. Cylinder

   j. … … …