Problem List for Practice

A. Preliminary

1. Write a program to print "**Hellow World !** ".
2. Write a program to take input from keyboard.
3. The length and height of a rectangle and radius of a circle are input through the keyboard. Write a program to find the area & perimeter of the rectangle and the area & circumference of the circle.
4. Rahim's basic salary is input through the keyboard. His House rent allowance is 30% of basic salary and medical allowance is 5% of basic salary. He gets extra 1000 tk as technical allowance. Write a program to calculate his gross salary and print the result.
5. The distance between SEU main campus and Rajshahi campus (in km) is input through keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.
6. Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into centigrade degrees.
7. Two numbers are input through the keyboard into two locations A and B. Write a program to interchange the contents of A and B.
8. If marks obtained by a student in 5 different subjects are input from keyboard, find out the aggregate marks and percentage marks obtained by the student.
9. If a 5 digit number is input through the keyboard, write a program to calculate and print the sum of its digits.
   [Hint: Use the modulus operator '%']
10. If a 5 digit number is input through the keyboard, write a program to reverse the number.
11. If a 4 digit number is input through the keyboard, write a program to obtain the sum of the first and last digit of this number.

B. Conditional

1. Three numbers are input through keyboard. Write a program to find out the **maximum** and **minimum** of these 3 numbers.
2. Take a year as input and determine whether it is a **leap year**.
   [Hint: Check the divisibility by 4, 100 and 400]
3. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss he incurred.
4. Any integer is input through keyboard. Write a program to find out whether it is an **odd number** or **even number**.
5. According to Gregorian calendar, it was Monday on the date 01/01/1900. If any year is input through the keyboard write a program to find out what is the day on 1st January of this year.
6. A five digit number is entered through the keyboard. Write a program to obtain the reverse number and to determine whether the original numbers are equal or not.

7. SEU grading policy is :
        (i)   80 % marks or above is A+
        (ii)   75% to 79% marks is A
        (iii)   70% to 74% marks is A-
        (iv)   65% to 69% marks is B+
        (v)   60% to 64% marks is B
        (vi)   55% to 59% marks is B-
        (vii) 50% to 54% marks is C+
        (viii) 45% to 49% marks is C
        (ix)   40% to 44% marks is D
        (x)   Below 40% is F

Write a program which will take an input from user and calculate the grade of a student according to SEU grading policy based on that input.

8. A certain grade of steel is graded according to the following conditions:
        (i) Hardness must be greater than 60
        (ii) Carbon content must be less than 0.7
        (iii)Tensile strength must be greater than 5000

The grades are as follows:
Grade is 10 if all three conditions are met
Grade is 9 if condition (i) and (ii) are met
Grade is 8 if condition (ii) and (iii) are met
Grade is 7 if condition (i) and (iii) are met
Grade is 6 if only one condition is met
Grade is 5 if none of the conditions are met

Write a program which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.

C. Lopping

1. **x** and **n** are input through keyboard. Write a program to compute x^n , $n!$, ^nC_r , ^nP_r

2. Write a program to determine the **GCD** (greatest common divisor) and **LCM** (least common multiple) of 3 numbers.

3. Find out the sum of each of the following series. n is the input from user for series (iv) to (vi)
        (i) $3 + 11 + 19 + \ldots + 1691$.
        (ii) $7 + 20 + 33 + \ldots$ (up to 100 th term)
        (iii) $5 - 11 + 17 - \ldots$ (up to 75 th term)
        (iv) $1 + (1 + 2) + (1 + 2 + 3) + \ldots + (1 + 2 + 3 + \ldots + n)$
        (v) $1 + \dfrac{2^2}{2!} + \dfrac{3^2}{3!} + \ldots + \dfrac{n^2}{n!}$
        (vi) $2 * 7 * 12 * \ldots * 37$

4. Write a program to determine all **prime numbers** within the range **[a …b]** where **a** & **b** are input through keyboard.

5. Construct the following table. Here **n** is input from the user.

1	2	3	…	n
2	4	6	…	2n

```
3     6     9     ...     3n
.     .     .     ...     .
.     .     .     ...     .
.     .     .     ...     .
n     2n    3n    ...     nn
```

6. Write a program to find out first n **perfect number** where **n** is the input from user.

7. Write a program to find first n **Fibonacci number** where **n** is the input from user.

8. Write a program to show the following triangle/rectangle of '*'s or numbers. Take **n** as input from user to determine the number of rows of the structure. (eg: n = 5)

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


        *
       *   *
      *       *
     *           *
    * * * * * * * * *


        1
       1 2 1
      1 2 3 2 1
     1 2 3 4 3 2 1
    1 2 3 4 5 4 3 2 1


    * * * * *
    * * * * *
    * * * * *
    * * * * *
    * * * * *


    * * * * *
    *       *
    *       *
    *       *
    * * * * *


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

```
1       1
1 2 3 2 1


          *
         * * *
        * * * * *
       * * * * * * *
      * * * * * * * * *
       * * * * * * *
        * * * * *
         * * *
          *


          *
         *   *
        *       *
       *         *
      *           *
       *         *
        *       *
         *   *
          *


          1
         1 2 1
        1 2 3 2 1
       1 2 3 4 3 2 1
      1 2 3 4 5 4 3 2 1
       1 2 3 4 3 2 1
        1 2 3 2 1
         1 2 1
          1


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

```
1 2 3 4 5 4 3 2 1
 1 2 3 4 3 2 1
  1 2 3 2 1
   1 2 1
    1
   1 2 1
  1 2 3 2 1
 1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

9. Write a program to print out all **Armstrong numbers** between 1 and 10000. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. For example, 153 = (1*1*1) + (5*5*5) + (3*3*3).

10. Write a program to calculate how many 5 digit numbers can be created if the following terms apply :
    (i)   the leftmost digit is even
    (ii)   the second digit is odd
    (iii) the third digit is a non even prime
    (iv)   the fourth and fifth are two random digits not used before in the number.