1. (Count positive and negative numbers and compute the average of numbers) Write a program that reads an unspecified number of integers, determines how many positive and negative values have been read, and computes the total and average of the input values (not counting zeros). Your program ends with the input 0. Display the average as a floating-point number.
2. (Financial application: compute future tuition) Suppose that the tuition for a university is $10,000 this year and increases 5% every year. In one year, the tuition will be $10,500. Write a program that computes the tuition in ten years and the total cost of four years' worth of tuition after the tenth year.
3. Write a program that displays the following table on console for n numbers and m powers that user enters:

a	a^2	a^3
1	1	1
2	4	8
3	9	27
4	16	64

4. (Find two highest scores) Write a program that prompts the user to enter the number of students and each student's name and score, and finally displays the student with the highest score and the student with the highest score.
5. (Display pyramid) Write a program that prompts the user to enter an integer from 1 to 15 and displays a pyramid, as shown in the following sample run:

```
Enter the number of lines: 7 Enter
                    1
                  2 1 2
                3 2 1 2 3
              4 3 2 1 2 3 4
            5 4 3 2 1 2 3 4 5
          6 5 4 3 2 1 2 3 4 5 6
        7 6 5 4 3 2 1 2 3 4 5 6 7
```

6. (Display four patterns using loops) Use nested loops that display the following patterns.

```
Pattern A        Pattern B        Pattern C          Pattern D
1                1 2 3 4 5 6              1          1 2 3 4 5 6
1 2              1 2 3 4 5              2 1            1 2 3 4 5
1 2 3            1 2 3 4              3 2 1              1 2 3 4
1 2 3 4          1 2 3              4 3 2 1                1 2 3
1 2 3 4 5        1 2              5 4 3 2 1                  1 2
1 2 3 4 5 6      1              6 5 4 3 2 1                    1
```

7. (financial application: compare loans with various interest rates) Write a program that lets the user enter the loan amount and loan period in number of years and displays the monthly and total payments for each interest rate starting from 5% to 8% with an increment of 1/8. Here is a sample run:

```
Loan Amount: 10000 Enter
Number of Years: 5 Enter
Interest Rate    Monthly Payment    Total Payment

5.000%           188.71             11322.74
5.125%           189.29             11357.13
5.250%           189.86             11391.59
...
7.875%           202.17             12129.97
8.000%           202.76             12165.84
```

8. (Compute pi) You can approximate pi by using the following series:

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \cdots + \frac{(-1)^{i+1}}{2i-1}\right)$$

Write a program that displays the pi value for i = 10000, 20000, …, and 100000

9. Write a program that calculates n factorial entered by user.
10. Write a program that displays first n prime numbers
11. Write a program that displays GCD of two numbers entered by user
12. Write a program that displays first n Fibonacci numbers
13. (Financial application: compound value) Suppose you save $100 each month into a savings account with the annual interest rate 5%. So, the monthly interest rate is 0.05 / 12 = 0.00417. After the first month, the value in the account becomes:

```
100 * (1 + 0.00417) = 100.417
```

After the second month, the value in the account becomes

```
(100 + 100.417) * (1 + 0.00417) = 201.252
```

After the third month, the value in the account becomes

```
(100 + 201.252) * (1 + 0.00417) = 302.507
```

and so on.

Write a program that prompts the user to enter an amount (e.g., 100), the annual interest rate (e.g., 5) and the number of months (e.g., 6) and displays the amount in the savings account after the given month

14. (Perfect number) A positive integer is called a perfect number if it is equal to the sum of all of its positive divisors, excluding itself. For example, 6 is the first perfect number 6 = 3 + 2 + 1. The next is 28 = 14 + 7 + 4 + 2 + 1. There are four perfect numbers less than 10,000. Write a program to find all these four numbers.

15. (Statistics: compute mean and standard deviation): In business applications, you are often asked to compute the mean and standard deviation of data. The mean is simply the average of the numbers. The standard deviation is a statistic that tells you how tightly all the various data are clustered around the mean in a set of data. For example, what is the average age of the students in a class? How close are the ages? If all the students are the same age, the deviation is 0.

    Write a program that prompts the user to enter ten numbers, and displays the mean and standard deviation of these numbers using the following formula:

$$\text{mean} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n} \qquad \text{deviation} = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}}{n-1}}$$

    Here is a sample run:

```
Enter ten numbers: 1 2 3 4.5 5.6 6 7 8 9 10 Enter
The mean is 5.61
The standard deviation is 2.99794
```