==========

1. What is wrong with this code fragment?

```
unsigned short int  SomeArray[5][4];
 for (int i = 0 ; i < 4 ; i++ )
        for (int j = 0; j < 5; j++)
                SomeArray [i][j] = i + j ;
```

2. What is wrong with this code fragment?

```
unsigned short int  SomeArray[5][4];
 for(int i = 0 ; i < = 5 ; i++ )
        for(int j = 0; j <= 4; j++)
                SomeArray [i][j] = i + j ;
```

3. Write a program that find the maximum and minimum elements for a 2-dimensional array entered by the user.
4. Write a program to sort a list of numbers descendingly. Use a function to make the sort.
5. Modify the previous program so that it terminates after the first pass in which no two elements are interchanged.
6. Write a program to accept the names of a group of students and their marks in the computer exam and print a list of the names and their corresponding marks stored in ascending order. Use a function to make the sort.
7. Write a program that reads n integers into an array and then prints the value of each distinct element along with the number of times it occurs on a separate line. The values should be printed in a descending order. For example, if the input values are: -7 3 3 -7 5 5 3 then the program should print:

5 occurs 2 times

3 occurs 3 times
-7 occurs 2 times

8. Write a function called reverseit( ) that reverses a string. Use a for loop that swaps the first and last characters, then the second and next to last characters, and so on. The string should be passed to reverseit( ) as an argument. Write a program to exercise reverseit( ). The program should get a string from the user, call reverseit and print out the result. Use an input method that allows strings containing blanks.
9. To familiarise yourself with using arrays write a program that declares two `float` arrays, say with 5 elements each, and carries out the following:

- Input some data from the user into the two arrays.
- Output the sum of the elements in each of the two arrays.
- Output the inner product of the two arrays - that is the sum of the products of corresponding elements `A[0]*B[0] + A[1]*B[1]+` ....etc.
- Produce an estimate of how different the values in the two arrays are by evaluating the sum of squares of the differences between corresponding elements of the two arrays divided by the number of elements.

Start by only entering and printing the values in the arrays to ensure you are capturing the data correctly. Then add each of the facilities above in turn.

10. Write a program that can do the following:

- addition of two matrices
- subtraction of two matrices
- multiplication of a matrix by a scalar
- multiplication of a matrix by a matrix
- transpose a matrix

The order of the matrices could be 3 x 3, or variable if you want.
The project has to be solved in groups of no more than four students.

11. A popular method of displaying data is in a Histogram. A histogram counts how many items of data fall in each of `n` equally sized intervals and displays the results as a bar chart in which each bar is proportional in length to the number of data items falling in that interval.

    Write a program that generates `n` random integers in the range 0-99 and produces a Histogram from the data. Assume that we wish to count the number of numbers that lie in each of the intervals 0-9, 10-19, 20-29, ..., 90-99. This requires that we hold 10 counts, use an array to hold the 10 counts. While it would be possible to check which range a value `x` lies in by using `if-else` statements this would be pretty tedious. A much better way is to note that the value of `x/10` returns the index of the count array element to increment. Having calculated the interval counts draw the Histogram by printing each bar of the Histogram as an appropriately sized line of X's across the screen as below

```
 0 -  9  16  XXXXXXXXXXXXXXXX
10 - 19  13  XXXXXXXXXXXXX
20 - 29  17  XXXXXXXXXXXXXXXXX
    etc.
```

12. In question 9 above you should have written C++ statements to enter numbers into an array. Convert these statements into a general function for array input. Your function should indicate the number of elements to be entered and should signal an error situation if this is greater than the size of the array--think about the required parameters. Also write a function to output `n` elements of a given array five to a line.

Write a driver program to test these functions and once you are satisfied they are working correctly write functions:

- To return the minimum element in the first `n` elements of an array.
- To return a count of the number of corresponding elements which differ in the first `n` elements of two arrays of the same size.
- Which searches the first `n` elements of an array for an element with a given value. If the value is found then the function should return **true** and also return the index of the element in the array. If not found then the function should return **false**.

In these functions incorporate error testing for a number of elements greater than the array size.

13. The program should read in a text string containing a list of numbers separated by + or - and output the sum. The program should also tell how many positive numbers and how many negative (subtracted) numbers there are.