Practice Questions for two dimensional arrays

1. Write a function that creates a two-dimensional matrix representing the Pascal triangle. In a Pascal triangle, each element is the sum of the element directly above it and the element to the left of the element directly above it (if any). A Pascal triangle of size 7 is shown below:
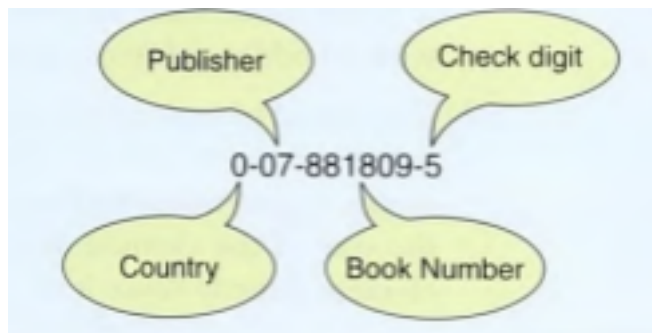
```
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
```

The first element of the first row and the first two elements of the second row are set to 1 initially.

2. Write a function that copies a one-dimensional array of n elements into a two-dimensional array of k rows and j columns. The rows and columns must be a valid factor o the number of elements in the one-dimensional array; that is, k*j = n.

3. Write a program that creates an array of 100 random integers in the range 1 to 200 and then, using the sequential search, searches the array 100 times using randomly generated targets in the same range. At the end of the program, display the following statistics:

   a. The number of searches completed.
   b. The number of successful searches.
   c. The percentage of successful searches.
   d . The average number of tests per search .

   To determine the average tests per search , you will need to count the number of tests for each search.

4. An international standard book number (ISBN) is used to uniquely identify a book. It is made of 10 digits, as shown in Figure.

Write a function that tests an ISBN to see if it is valid. For an ISBN number to be valid, the weighted sum of the 10 digits must be evenly divisible by 11. The tenth digit may x, which indicates 10.

To determine the weighted sum, the value of each position is multiplied by its relative position, starting from the right, and the sum of the products is determined. The calculation of the weighted sum for the ISBN shown above is demonstrated in the table below:

Code	Weight	Weighted Value
0	10	0
0	9	0
7	8	56
8	7	56
8	6	48
1	5	5

Code	Weight	Weighted Value
8	4	32
0	3	0
9	2	18
5	1	5
	Weighted Sum	220

Since the weighted sum i.e. 220 modulus 11 is 0, the ISBN number is valid. Test your function with the above example, the ISBN number for this text (see the copyright page), and 0-08-781809-5 (an invalid ISBN—the third and fourth digits are reversed).

5. Write a function that reverses the elements of an array so that the last element becomes the first, the second from the last becomes the second , and so forth . The function is to reverse the elements in place—that is, without using another array. (It is permissible to use a variable to hold an element temporarily.) Then write a test driver to test your function . Test it twice , once with an even number of elements in the array and once with an odd number of elements in the array.

6. Write a program to keep records and perform statistical analysis lor a class of students. The class may have up to 40 students. There are five quizzes during the term. Define a function that will print the maximum, minimum and average for each quiz. Define another function that prints the average of each student, the maximum and the marks he has got in all five quizzes.