Practice problems on arrays. Write C++ programs to carry out the specified tasks.

(1) Read the entries of an array of 10 integers from a user. Compute x as the average of the 10 entries and then compute the average of those entries that are greater than or equal to x. Print this final average.

(2) Write a C++ program that sets up an array of integers with capacity 20. It should then generate the 20 entries randomly in turn. Each entry must be an integer between 1 and 20, however it must also be different from all previous entries in the array. Generate the entries as random numbers and repeatedly make new numbers until a legal entry value is found. The program should finish by printing the list of 20 array values that it has selected.

(3) Eight queens are to be placed on an 8 x 8 chessboard in such a way that one queen is to be in each row. A program will store an array x[] with capacity 8 to represent such a configuration. If x[r] has value c then in row r there is a queen in column c. Write a program that asks a user to enter the columns that contain queens in the 8 rows. The program then prints the board. For example, if the user enters: 0,3,4,0,0,7,6,7 the program should print:

```
Q.......
...Q....
....Q...
Q........
Q.......Q
....Q...
.......Q
......Q.
```

(4) (Similar to problem 3, but the user specifies a row for each column.) Eight queens are to be placed on an 8 x 8 chessboard in such a way that one queen is to be in each column. A program will store an array x[] with capacity 8 to represent such a configuration. If x[c] has value r then in row r there is a queen in column c. Write a program that asks a user to enter the rows that contain queens in the 8 columns. The program then prints the board. For example, if the user enters: 2,3,4,0,1,7,6,5 the program should print:

```
...Q....
....Q...
Q........
..Q......
.......Q
......Q.
```

(5) Again related to problems 3 and 4. Eight queens are to be placed on an 8 x 8 chessboard in such a way that one queen is to be in each row and one queen is to be in each column. A program will store an array x[] with capacity 8 to represent such a configuration. If x[c] has value r then in row r there is a queen in column c. Write a program that asks a user to enter the rows that contain queens in the 8 columns. The program then checks whether there is just one queen per row. For example, if the user enters: 2,3,4,0,1,7,6,5 the program should print: OK (because the user has entered the configuration that was entered in problem 3). But if the user enters 0,0,1,2,3,4,5,6 the program should print: No good. (Why?)
Eight queens are to be placed on an 8 x 8 chessboard in such a way that one queen is to be in each row and one queen is to be in each column and so that no two queens share a diagonal. A program will store an array x[] with capacity 8 to represent such a configuration. If x[c] has value r then in row r there is a queen in column c. Write a program that asks a user to enter the rows that contain queens in the 8 columns. The program then checks whether the configuration is legal. For example, if the user enters: 2,3,4,0,1,7,6,5 the program should print: No good. (Why?)

Write a program to read an array of 11 integers from a user and compute the median entry of the array.