

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
```

(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
.....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?)

(6) Again related to problems 3, 4, and 5.

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?)

(7)

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