COP 3503 Recitation #3 INPUT/OUTPUT SPECIFICATION
SEE THE CORRESPONDING ASSIGNMENT DESCRIPTION ON WEBOURSES

1) Write a recursive method to determine the number of 1s in the binary representation of a positive integer n. Here is the prototype:
// Precondition: n > 0.
public static int numOnes(int n);

Source Filename: NumOnes.java
Input Filename: numones.in
Input Format: The file has one test case per line. A test case is an integer, n, for which the program shall output the number of 1s in the binary representation of n.

SAMPLE INPUT:

```
63
64
65
19
```

SAMPLE OUTPUT:

```
6
1
2
3
```

2) Write a recursive method to determine the minimum value in an integer array. (Hint: Split the array in two halves.)
public static int minVal(int[] numbers);

Source Filename: ArrayMin.java
Input Filename: arraymin.in
Input Format: The file has one test case per line. A test case is an array of integers, A, for which the program shall output the minimum integer in A.

SAMPLE INPUT:

```
5 7 1 3 77
600 4 59 2 5
```

SAMPLE OUTPUT:

```
1
2
```

3) Consider a grid of nxn grid of integers like the following:
…

Source Filename: GridSearch.java
Input Filename: gridsearch.in

Input Format: The file has one test case per line. A test case is a list of integers which take the following format:

<start x> <start y> <end x> <end y> <n> <n x n integers giving the grid>

For example, consider the following grid, with starting coordinates **(2, 1)** and ending coordinates **(0, 1)**.

x	0	1	2	3
0	2	1	2	3
1	**3**	2	**1**	1
2	2	2	1	2
3	1	3	2	3

y

The grid above corresponds to the following test case in the input file.

2 1 0 1 4 2 1 2 3 3 2 1 1 2 2 1 2 1 3 2 3

Output Format: For each test case, print ***true*** or ***false*** on a new line, if there is or there is not a path from (start x, start y) to (end x, end y), respectively.

SAMPLE INPUT:

2 1 0 1 4 2 1 2 3 3 2 1 1 2 2 1 2 1 3 2 3
2 3 0 3 4 2 1 2 3 3 2 1 1 2 2 1 2 1 3 2 3

SAMPLE OUTPUT:

true
false