Question 4: 2D Array — 9 points

Canonical solution

(a) — **3 points**

```
public static boolean isNonZeroRow(int[][] array2D, int r)
{
   for (int col = 0; col < array2D[0].length; col++)
   {
      if (array2D[r][col] == 0)
      {
         return false;
      }
   }
   return true;
}
```

(b) — **6 points**

```
public static int[][] resize(int[][] array2D)
{
   int numRows = array2D.length;
   int numCols = array2D[0].length;

   int[][] result = new int[numNonZeroRows(array2D)][numCols];
   int newRowIndex = 0;

   for (int r = 0; r < numRows; r++)
   {
      if (isNonZeroRow(array2D, r))
      {
         for (int c = 0; c < numCols; c++)
         {
            result[newRowIndex][c] = array2D[r][c];
         }
         newRowIndex++;
      }
   }
   return result;
}
```

(a) `isNonZero`

	Scoring Criteria	Decision Rules	
1	Compares an item from `array2D` with `0`	Responses **will not** earn the point if they fail to attempt the comparison, even if they access an item from `array2D`	**1 point**
2	Accesses every item from row `r` of 2D array (*no bounds errors*)	Responses **can** still earn the point even if they return early from an otherwise correctly-bounded loop	**1 point**
3	Returns `true` if and only if row contains no zeros	Responses **can** still earn the point even if they process a column of the 2D array rather than a row Responses **will not** earn the point if they fail to return a value in some cases	**1 point**
		Total for part (a)	**3 points**

(b) `resize`

	Scoring Criteria	Decision Rules	
4	Calls `numNonZeroRows` and `isNonZeroRow`	Responses **can** still earn the point even if they fail to use or store the return value Responses **will not** earn the point if they • include incorrect number or type of parameters • call methods on an object or class other than `ArrayResizer`	**1 point**
5	Identifies rows with no zeros (*in the context of an* `if`)	Responses **can** still earn the point even if they call `isNonZeroRow` incorrectly, if the row being tested is clearly identified (index or reference)	**1 point**
6	Declares and creates a new 2D array of the correct size	Response **will not** earn the point if they transpose the dimensions of the created array	**1 point**
7	Maintains an index in the new array	Responses **will not** earn the point if they • fail to declare, initialize, and update a different index • maintain the index in a way that overwrites, skips, or duplicates rows	**1 point**
8	Traverses all necessary elements of `array2D` (*no bounds errors*)	Responses **can** still earn the point even if they • cause a bounds error by declaring and creating a new 2D array of an incorrect size • fail to maintain an index in the new array correctly, resulting in a bounds error • fail to access individual elements in a nested loop, if they access each row as an entire row Responses **will not** earn the point if they transpose coordinates, leading to a bounds error and/or copying columns	**1 point**
9	Copies all and only rows identified as having no zero elements into the new array	Responses **can** still earn the point even if they • copy a reference • identify rows incorrectly, if the logical sense can be determined and is correct • copy columns instead of rows, consistent with the dimensions of the created 2D array	**1 point**

	Responses **will not** earn the point if they • remove or overwrite data from `array2D` (instead of or in addition to copying it to the new array) • reverse the logical sense of which rows to copy	
	Total for part (b)	**6 points**

Question-specific penalties
-1 (u) Use `array2D[].length` to refer to the number of columns in a row of the 2D array

Total for question 4 9 points