

9 points

Question 4: 2D Array

Canonical solution

(a)

```
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;
}
```

3 points

(b)

```
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;
}
```

6 points

(a) isNonZero

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

(b) `resize`

Scoring Criteria		Decision Rules	
4	Calls <code>numNonZeroRows</code> and <code>isNonZeroRow</code>	Responses can still earn the point even if they fail to use or store the return value	1 point
		Responses will not earn the point if they - include incorrect number or type of parameters - call methods on an object or class other than <code>ArrayResizer</code>	
5	Identifies rows with no zeros (<i>in the context of an if</i>)	Responses can still earn the point even if they call <code>isNonZeroRow</code> 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 <code>array2D</code> (<i>no bounds errors</i>)	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	1 point
		Responses will not earn the point if they transpose coordinates, leading to a bounds error and/or copying columns	
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[0].length` to refer to the number of columns in a row of the 2D array

Total for question 4 9 points