AP® Computer Science A
Scoring Guidelines
Applying the Scoring Criteria

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1-Point Penalty
v) Array/collection access confusion ([ ] get)
w) Extraneous code that causes side-effect (e.g., printing to output, incorrect precondition check)
x) Local variables used but none declared
y) Destruction of persistent data (e.g., changing value referenced by parameter)
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No Penalty
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- Common mathematical symbols used for operators (× • ÷ ≤ ≥ <> ≠)
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- Missing ; where structure clearly conveys intent
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Question 1: Methods and Control Structures  

Canonical solution

(a)  
```java
public int scoreGuess(String guess) {
    int count = 0;
    for (int i = 0; i <= secret.length() - guess.length(); i++) {
        if (secret.substring(i, i + guess.length()).equals(guess)) {
            count++;
        }
    }
    return count * guess.length() * guess.length();
}
```

(b)  
```java
public String findBetterGuess(String guess1, String guess2) {
    if (scoreGuess(guess1) > scoreGuess(guess2)) {
        return guess1;
    }
    if (scoreGuess(guess2) > scoreGuess(guess1)) {
        return guess2;
    }
    if (guess1.compareTo(guess2) > 0) {
        return guess1;
    }
    return guess2;
}
```
(a)  `scoreGuess`

<table>
<thead>
<tr>
<th>Scoring Criteria</th>
<th>Decision Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Compares <code>guess</code> to a substring of <code>secret</code></td>
<td>Responses <em>can</em> still earn the point even if they only call <code>secret.indexOf(guess)</code>&lt;br&gt;Responses <em>will not</em> earn the point if they use <code>==</code> instead of <code>equals</code></td>
</tr>
<tr>
<td>2 Uses a substring of <code>secret</code> with correct length for comparison with <code>guess</code></td>
<td>Responses <em>can</em> still earn the point even if they&lt;br&gt;• only call <code>secret.indexOf(guess)</code>&lt;br&gt;• use <code>==</code> instead of <code>equals</code></td>
</tr>
<tr>
<td>3 Loops through all necessary substrings of <code>secret</code> (<em>no bounds errors</em>)</td>
<td>Responses <em>will not</em> earn the point if they skip overlapping occurrences</td>
</tr>
<tr>
<td>4 Counts number of identified occurrences of <code>guess</code> within <code>secret</code> (<em>in the context of a condition involving both <code>secret</code> and <code>guess</code></em>)</td>
<td>Responses <em>can</em> still earn the point even if they&lt;br&gt;• initialize count incorrectly or not at all&lt;br&gt;• identify occurrences incorrectly</td>
</tr>
<tr>
<td>5 Calculates and returns correct final score (<em>algorithm</em>)</td>
<td>Responses <em>will not</em> earn the point if they&lt;br&gt;• initialize count incorrectly or not at all&lt;br&gt;• fail to use a loop&lt;br&gt;• fail to compare <code>guess</code> to multiple substrings of <code>secret</code>&lt;br&gt;• count the same matching substring more than once&lt;br&gt;• use a changed or incorrect <code>guess</code> length when computing the score</td>
</tr>
</tbody>
</table>

**Total for part (a)** 5 points
(b) findBetterGuess

<table>
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<tr>
<th>Scoring Criteria</th>
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</tr>
</thead>
</table>
| **6** Calls `scoreGuess` to get scores for `guess1` and `guess2` | Responses **will not** earn the point if they  
- fail to include parameters in the method calls  
- call the method on an object or class other than `this` |
| **7** Compares the scores | Responses **will not** earn the point if they  
- only compare using `==` or `!=`  
- fail to use the result of the comparison in a conditional statement |
| **8** Determines which of `guess1` and `guess2` is alphabetically greater | Responses **can still** earn the point even if they reverse the comparison  
- responses **will not** earn the point if they  
  - reimplement `compareTo` incorrectly  
  - use result of `compareTo` as if `boolean` |
| **9** Returns the identified `guess1` or `guess2` *(algorithm)* | Responses **can still** earn the point even if they  
- call `scoreGuess` incorrectly  
- compare strings incorrectly  
- responses **will not** earn the point if they  
  - reverse a comparison  
  - omit either comparison  
  - fail to return a guess in some case |

**Total for part (b)** 4 points

**Question-specific penalties**

None

**Total for question 1** 9 points
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public class CombinedTable
{
    private SingleTable table1;
    private SingleTable table2;

    public CombinedTable(SingleTable tab1, SingleTable tab2)
    {
        table1 = tab1;
        table2 = tab2;
    }

    public boolean canSeat(int n)
    {
        if (table1.getNumSeats() + table2.getNumSeats() - 2 >= n)
        {
            return true;
        }
        else
        {
            return false;
        }
    }

    public double getDesirability()
    {
        if (table1.getHeight() == table2.getHeight())
        {
            return (table1.getViewQuality() +
                    table2.getViewQuality()) / 2;
        }
        else
        {
            return ((table1.getViewQuality() +
                     table2.getViewQuality()) / 2) - 10;
        }
    }
}
<table>
<thead>
<tr>
<th>Scoring Criteria</th>
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<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Declares class header: class CombinedTable and constructor header: CombinedTable(SingleTable ___, SingleTable ___) (must not be private)</td>
<td>Responses can still earn the point even if they declare the class header as class CombinedTable extends SingleTable</td>
<td>1 point</td>
</tr>
<tr>
<td>2 Declares appropriate private instance variables including at least two SingleTable references</td>
<td>Responses can still earn the point even if they declare an additional instance variable to cache the number of seats at the combined table Responses will not earn the point if they • declare and initialize local variables in the constructor instead of instance variables • declare additional instance variable(s) that cache the desirability rating • omit keyword private • declare variables outside the class</td>
<td>1 point</td>
</tr>
<tr>
<td>3 Constructor initializes instance variables using parameters</td>
<td>Responses can still earn the point even if they declare and initialize local variables in the constructor instead of instance variables</td>
<td>1 point</td>
</tr>
<tr>
<td>4 Declares header: public boolean canSeat(int ___)</td>
<td></td>
<td>1 point</td>
</tr>
<tr>
<td>5 Calls getNumSeats on a SingleTable object</td>
<td>Responses can still earn the point even if they call getNumSeats on constructor parameters or local variables of type SingleTable in the constructor Responses will not earn the point if they call the SingleTable accessor method on something other than a SingleTable object</td>
<td>1 point</td>
</tr>
<tr>
<td>6 canSeat(n) returns true if and only if sum of seats of two tables - 2 &gt;= n</td>
<td>Responses can still earn the point even if they call getNumSeats incorrectly</td>
<td>1 point</td>
</tr>
<tr>
<td>7 Declares header: public double getDesirability()</td>
<td></td>
<td>1 point</td>
</tr>
<tr>
<td>8 Calls getHeight and getViewQuality on SingleTable objects</td>
<td>Responses can still earn the point even if they call getHeight or getViewQuality on constructor parameters or local variables of type SingleTable in the constructor</td>
<td>1 point</td>
</tr>
<tr>
<td>9</td>
<td>getDesirability computes average of constituent tables’ view desirabilities</td>
<td>Responses will not earn the point if they call the <code>SingleTable</code> accessor methods on something other than a <code>SingleTable</code> object</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Responses can still earn the point even if they</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• call <code>getHeight</code> or <code>getViewQuality</code> on constructor parameters or local variables of type <code>SingleTable</code> in the constructor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fail to return the computed average (return is not assessed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Responses will not earn the point if they</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fail to have an <code>if</code> statement and a correct calculation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• choose the incorrect value (average vs. average – 10) based on evaluation of the <code>if</code> statement condition</td>
</tr>
</tbody>
</table>

**Question-specific penalties**

None

**Total for question 2** 9 points
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Question 3: Array / ArrayList  

9 points

Canonical solution

(a)  
```java
public void addMembers(String[] names, int gradYear)
{
    for (String n : names)
    {
        MemberInfo newM = new MemberInfo(n, gradYear, true);
        memberList.add(newM);
    }
}
```

(b)  
```java
public ArrayList<MemberInfo> removeMembers(int year)
{
    ArrayList<MemberInfo> removed = new ArrayList<MemberInfo>();

    for (int i = memberList.size() - 1; i >= 0; i--)
    {
        if (memberList.get(i).getGradYear() <= year)
        {
            if (memberList.get(i).inGoodStanding())
            {
                removed.add(memberList.get(i));
            }
            memberList.remove(i);
        }
    }
    return removed;
}
(a) addMembers

<table>
<thead>
<tr>
<th>Scoring Criteria</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Accesses all elements of names (\text{no bounds errors})</td>
<td>Responses will not earn the point if they fail to access elements of the array, even if loop bounds are correct</td>
</tr>
<tr>
<td>2 Instantiates a MemberInfo object with name from array, provided year, and good standing</td>
<td>1 point</td>
</tr>
<tr>
<td>3 Adds MemberInfo objects to memberList (in the context of a loop)</td>
<td>Responses can earn the point even if they instantiate MemberInfo objects incorrectly</td>
</tr>
</tbody>
</table>

Total for part (a) 3 points
### Scoring Criteria and Decision Rules

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>4 Declares and initializes an <code>ArrayList</code> of <code>MemberInfo</code> objects</td>
<td>Responses <strong>will not</strong> earn the point if they initialize the variable with a reference to the instance variable</td>
<td>1 point</td>
</tr>
<tr>
<td>5 <strong>Accesses all elements of</strong> <code>memberList</code> <strong>for potential removal (no bounds errors)</strong></td>
<td>Responses <strong>will not</strong> earn the point if they • fail to use <code>get(i)</code> • fail to attempt to remove an element • skip an element • throw an exception due to removing</td>
<td>1 point</td>
</tr>
<tr>
<td>6 <strong>Calls</strong> <code>getGradYear</code> or <code>inGoodStanding</code></td>
<td>Responses <strong>can</strong> still earn the point even if they call only one of the methods</td>
<td>1 point</td>
</tr>
<tr>
<td>7 <strong>Distinguishes any three cases, based on graduation status and standing</strong></td>
<td>Responses <strong>will not</strong> earn the point if they <strong>do not</strong> behave differently in all three cases</td>
<td>1 point</td>
</tr>
<tr>
<td>8 <strong>Identifies graduating members</strong></td>
<td>Responses <strong>can</strong> still earn the point even if they • fail to distinguish three cases • fail to access standing at all • access the graduating year incorrectly</td>
<td>1 point</td>
</tr>
<tr>
<td>9 Removes appropriate members from <code>memberList</code> and adds appropriate members to the <code>ArrayList</code> to be returned</td>
<td>Responses <strong>can</strong> still earn the point even if they • <strong>call</strong> <code>getGradYear</code> or <code>inGoodStanding</code> <strong>incorrectly</strong> • access elements of <code>memberList</code> incorrectly • initialize the <code>ArrayList</code> incorrectly • fail to return the list that was built (<strong>return is not assessed</strong>)</td>
<td>1 point</td>
</tr>
</tbody>
</table>

**Total for part (b)** 6 points
Question-specific penalties
None

Total for question 3  9 points
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Question 4: 2D Array

Canonical solution

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

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

    int[][] result = new int[numRows][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;
}
```
### Scoring Criteria and Decision Rules

<table>
<thead>
<tr>
<th></th>
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<th>Decision Rules</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compares an item from <code>array2D</code> with 0</td>
<td>Responses <strong>will not</strong> earn the point if they fail to attempt the comparison, even if they access an item from <code>array2D</code></td>
<td>1 point</td>
</tr>
<tr>
<td>2</td>
<td>Accesses every item from row <code>r</code> of 2D array <em>(no bounds errors)</em></td>
<td>Responses <strong>can</strong> still earn the point even if they return early from an otherwise correctly-bounded loop</td>
<td>1 point</td>
</tr>
<tr>
<td>3</td>
<td>Returns <code>true</code> if and only if row contains no zeros</td>
<td>Responses <strong>can</strong> still earn the point even if they process a column of the 2D array rather than a row</td>
<td>1 point</td>
</tr>
</tbody>
</table>

Responses **will not** earn the point if they fail to return a value in some cases.

**Total for part (a)** 3 points
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>4</strong> Calls <code>numNonZeroRows</code> and <code>isNonZeroRow</code></td>
<td>Responses <strong>can</strong> still earn the point even if they fail to use or store the return value</td>
</tr>
<tr>
<td><strong>5</strong> Identifies rows with no zeros <em>(in the context of an if)</em></td>
<td>Responses <strong>can</strong> still earn the point even if they call <code>isNonZeroRow</code> incorrectly, if the row being tested is clearly identified (index or reference)</td>
</tr>
<tr>
<td><strong>6</strong> Declares and creates a new 2D array of the correct size</td>
<td>Response <strong>will not</strong> earn the point if they transpose the dimensions of the created array</td>
</tr>
<tr>
<td><strong>7</strong> Maintains an index in the new array</td>
<td>Responses <strong>will not</strong> earn the point if they</td>
</tr>
<tr>
<td><strong>8</strong> Traverses all necessary elements of <code>array2D</code> <em>(no bounds errors)</em></td>
<td>Responses <strong>can</strong> still earn the point even if they</td>
</tr>
<tr>
<td><strong>9</strong> Copies all and only rows identified as having no zero elements into the new array</td>
<td>Responses <strong>can</strong> still earn the point even if they</td>
</tr>
</tbody>
</table>
Responses will not earn the point if they
• remove or overwrite data from \texttt{array2D} (instead of or in addition to copying it to the new array)
• reverse the logical sense of which rows to copy

<table>
<thead>
<tr>
<th>Question-specific penalties</th>
<th>Total for part (b)</th>
<th>6 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 (u) Use \texttt{array2D[].length} to refer to the number of columns in a row of the 2D array</td>
<td>Total for question 4</td>
<td>9 points</td>
</tr>
</tbody>
</table>

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