



## **AP<sup>®</sup> Computer Science A 2004 Free-Response Questions**

**The materials included in these files are intended for noncommercial use by AP teachers for course and exam preparation; permission for any other use must be sought from the Advanced Placement Program<sup>®</sup>. Teachers may reproduce them, in whole or in part, in limited quantities, for face-to-face teaching purposes but may not mass distribute the materials, electronically or otherwise. This permission does not apply to any third-party copyrights contained herein. These materials and any copies made of them may not be resold, and the copyright notices must be retained as they appear here.**

The College Board is a not-for-profit membership association whose mission is to connect students to college success and opportunity. Founded in 1900, the association is composed of more than 4,500 schools, colleges, universities, and other educational organizations. Each year, the College Board serves over three million students and their parents, 23,000 high schools, and 3,500 colleges through major programs and services in college admissions, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT<sup>®</sup>, the PSAT/NMSQT<sup>®</sup>, and the Advanced Placement Program<sup>®</sup> (AP<sup>®</sup>). The College Board is committed to the principles of excellence and equity, and that commitment is embodied in all of its programs, services, activities, and concerns.

For further information, visit [www.collegeboard.com](http://www.collegeboard.com)

Copyright © 2004 College Entrance Examination Board. All rights reserved. College Board, Advanced Placement Program, AP, AP Central, AP Vertical Teams, APCD, Pacesetter, Pre-AP, SAT, Student Search Service, and the acorn logo are registered trademarks of the College Entrance Examination Board. PSAT/NMSQT is a registered trademark jointly owned by the College Entrance Examination Board and the National Merit Scholarship Corporation. Educational Testing Service and ETS are registered trademarks of Educational Testing Service. Other products and services may be trademarks of their respective owners.

For the College Board's online home for AP professionals, visit AP Central at [apcentral.collegeboard.com](http://apcentral.collegeboard.com).

# 2004 AP<sup>®</sup> COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS

## COMPUTER SCIENCE A SECTION II

Time—1 hour and 45 minutes

Number of questions—4

Percent of total grade—50

**Directions:** SHOW ALL YOUR WORK, REMEMBER THAT PROGRAM SEGMENTS ARE TO BE WRITTEN IN Java.

Notes:

- Assume that the classes listed in the Quick Reference found in the Appendix have been imported where appropriate.
- Unless otherwise noted in the question, assume that parameters in method calls are not `null` and that methods are called only when their preconditions are satisfied.

## 2004 AP<sup>®</sup> COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS

1. The following class `WordList` is designed to store and manipulate a list of words. The incomplete class declaration is shown below. You will be asked to implement two methods.

```
public class WordList
{
    private ArrayList myList; // contains Strings made up of letters

    // postcondition: returns the number of words in this WordList that
    //                  are exactly len letters long
    public int numWordsOfLength(int len)
    { /* to be implemented in part (a) */ }

    // postcondition: all words that are exactly len letters long
    //                  have been removed from this WordList, with the
    //                  order of the remaining words unchanged
    public void removeWordsOfLength(int len)
    { /* to be implemented in part (b) */ }

    // ... constructor and other methods not shown
}
```

- (a) Write the `WordList` method `numWordsOfLength`. Method `numWordsOfLength` returns the number of words in the `WordList` that are exactly `len` letters long. For example, assume that the instance variable `myList` of the `WordList` `animals` contains the following.

```
["cat", "mouse", "frog", "dog", "dog"]
```

The table below shows several sample calls to `numWordsOfLength`.

<u>Call</u>	<u>Result returned by call</u>
<code>animals.numWordsOfLength(4)</code>	1
<code>animals.numWordsOfLength(3)</code>	3
<code>animals.numWordsOfLength(2)</code>	0

Complete method `numWordsOfLength` below.

```
// postcondition: returns the number of words in this WordList that
//                  are exactly len letters long
public int numWordsOfLength(int len)
```

## 2004 AP<sup>®</sup> COMPUTER SCIENCE A FREE-RESPONSE QUESTIONS

- (b) Write the `WordList` method `removeWordsOfLength`. Method `removeWordsOfLength` removes all words from the `WordList` that are exactly `len` letters long, leaving the order of the remaining words unchanged. For example, assume that the instance variable `myList` of the `WordList` `animals` contains the following.

```
["cat", "mouse", "frog", "dog", "dog"]
```

The table below shows a sequence of calls to the `removeWordsOfLength` method.

<u>Call</u>	<u>myList after the call</u>
<code>animals.removeWordsOfLength(4);</code>	<code>["cat", "mouse", "dog", "dog"]</code>
<code>animals.removeWordsOfLength(3);</code>	<code>["mouse"]</code>
<code>animals.removeWordsOfLength(2);</code>	<code>["mouse"]</code>

Complete method `removeWordsOfLength` below.

```
// postcondition: all words that are exactly len letters long
//                have been removed from this WordList, with the
//                order of the remaining words unchanged
public void removeWordsOfLength(int len)
```