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Barron's 巴朗

AP 计算机科学 A

（第7版）

Barron's AP Computer Science A 7th Edition

[美] 特科尔斯基 (Roselyn Teukolsky M.S.) 著

:: 考点透析 应试技巧

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Preface 前言

This book is aimed at students reviewing for the AP Computer Science A exam. It would normally be used at the completion of an AP course. However, it contains a complete summary of all topics for the exam, and it can be used for self-study if accompanied by a suitable textbook.

The book provides a review of object-oriented programming, algorithm analysis, and data structures. It can therefore be used as a supplement to first-year college courses where Java is the programming language and as a resource for teachers of high school and introductory college courses.

This seventh edition includes all features of Java that will be tested on the AP exam.

The AP Computer Science Development Committee is placing greater emphasis on two-dimensional arrays. As a result, the following new sections have been added:

- using a for-each loop traversal
- treating a matrix as an array of arrays

All students should be able to create, initialize, modify, and traverse two-dimensional arrays. More questions on two-dimensional arrays have been added for this edition.

The GridWorld Case Study is gone! Starting in May 2015 there will be no questions on GridWorld. All GridWorld questions in the practice exams have been replaced by new questions, both multiple-choice and free-response.

The AP Computer Science Labs were developed as a replacement for GridWorld. However, there will be no questions on the specific content of the labs on the AP exam. Instead, there will be questions that test the concepts developed in the labs.

This seventh edition has a new chapter that summarizes the labs and highlights the concepts that are emphasized in them. The chapter contains a new section of multiple-choice questions based on these concepts. A new symbol in the margin, as shown here, is used throughout the book to draw attention to these concepts.

Another topic that is gone is the `Comparable` interface, which will no longer be tested on the AP exam. Students will, however, be expected to understand how the `compareTo` method is used for type `String`.

The style of all questions and examples in the book has been revamped to better reflect the style of recent exams.

There are three complete practice exams. The exams follow the format of the AP exam, with multiple-choice and free-response sections. One exam is presented after the introduction to the book for possible use as a diagnostic test. A diagnostic chart accompanies this test. Detailed solutions with explanations are provided for all exams. Two additional exams are provided on the optional CD-ROM. This edition contains several new questions. There is no overlap of questions between the exams.

Note that the scoring worksheets that accompany each exam, in both the book and CD-ROM, have been updated in this edition. They reflect the new College Board policy of not penalizing students for wrong answers on the multiple-choice section.

ACKNOWLEDGMENTS 致谢

I owe thanks to many people who helped in the creation of this book.

I am most grateful to my excellent editor, Linda Turner, of Barron's, for her friendly guidance and moral support throughout this project, over many years. I also thank all the other members of the Barron's staff who worked on the production of the book.

I am grateful to Steven Andrianoff and David Levine of St. Bonaventure University, New York, for their outstanding workshops that gave me a leg up in computer science. Many ideas from their Java workshops found their way into early editions of this book.

Thanks also to Robert Glen Martin for invaluable advice and suggestions.

Many thanks to the four wonderful students who helped me check the new questions for this edition: Lilia Escobedo, Rob Schlom, Irene Yoon, and Aryeh Zax.

Thank you to all of the computer science teachers throughout the country who took time to write to me with suggestions for the new edition, including my colleague at Ithaca High School, Fred Deppe.

A very special thank you to Judy Hromcik and Chris Nevison, who went way beyond the call of duty to help me with this new edition.

My husband, Saul, continues to be my partner in this project—typesetting the manuscript, producing the figures, and giving advice and moral support every step of the way. This book is dedicated to him.

Roselyn Teukolsky
Ithaca, NY
July 2014

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Introduction 绪论

Computer Science: The boring art
of coping with a large number of trivialities.
—Stan Kelly-Bootle, The Devil's DP Dictionary *(1981)*

GENERAL INFORMATION ABOUT THE EXAM 考试概要

The AP Computer Science exam is a three-hour written exam. No books, calculators, or computers are allowed! The exam consists of two parts that have equal weight:

- Section I: 40 multiple-choice questions in 1 hour and 15 minutes.
- Section II: 4 free-response questions in 1 hour and 45 minutes.

SCORING REMINDER

There is no penalty for wrong answers on the multiple-choice section.

Section I is scored by machine—you will bubble your answers with a pencil on a mark-sense sheet. Each question correctly answered is worth 1 point. There are no deductions for incorrect answers, and a question left blank is ignored.

Section II is scored by human readers—you will write your answers in a booklet provided. Free-response questions typically involve writing methods in Java to solve a given problem. Sometimes there are questions analyzing algorithms or designing and modifying data structures. You may be asked to write or design an entire class. To ensure consistency in the grading, each grader follows the same rubric, and each of your four answers may be examined by more than one reader. Each question is worth 9 points, with partial credit awarded where applicable. Your name and school are hidden from the readers.

Your raw score for both sections is converted to an integer score from 1 to 5, where 1 represents "Not at all qualified" and 5 represents "Extremely well qualified." Be aware that the awarding of AP credit varies enormously from college to college. The exam covers roughly a one-semester introductory college course.

The language of the AP exam is Java. Only a subset of the Java language will be tested on the exam. In writing your solutions to the free-response questions, however, you may use any Java features, including those that are not in the AP subset. For a complete description of this subset, see the College Board website at *http://www.collegeboard.com/student/testing/ap/subjects.html.* **Every language topic in this review book is part of the AP Java subset unless explicitly stated otherwise. Note that the entire subset is covered in the book.**

For both the multiple-choice and free-response sections of the exam, there will be a quick reference in the appendix. You can look at this ahead of time at *http://apcentral.collegeboard.com/apc/public/repository/ap_comp_sci_a_quick_reference.pdf.*

The quick reference contains The standard Java interfaces and classes with lists of their required methods.

HINTS FOR TAKING THE EXAM 参加考试的提示

The Multiple-Choice Section 选择题部分

- Since there are no deductions for wrong answers, you should guess when you've eliminated what you can.
- You have a little less than two minutes per question, so don't waste time on any given question. You can always come back to it if you have time at the end.
- Seemingly complicated array questions can often be solved by hand tracing the code with a small array of two or three elements. The same is true for matrices.
- Many questions ask you to compare two pieces of code that supposedly implement the same algorithm. Often one program segment will fail because it doesn't handle endpoint conditions properly (e.g., `num == 0`). *Be aware of endpoint conditions throughout the exam.*
- Since the mark-sense sheet is scanned by machine, make sure that you erase completely if you change an answer.

The Free-Response Section 开放式问答题部分

- Each free-response question is worth 9 points. Take a minute to read through the whole exam so that you can start with a question that you feel confident about. It gives you a psychological leg up to have a solid question in the bag.
- Don't omit a question just because you can't come up with a complete solution. Remember, partial credit is awarded. Also, if you can't do part (a) of a question, don't omit part (b)—they are graded independently.
- In writing solutions to a question, you must use the public methods of classes provided in that question wherever possible. If you write a significant chunk of code that can be replaced by a call to one of these methods, you will probably not receive full credit for the question.
- If an algorithm is suggested to solve a problem, just follow it. Don't reinvent the wheel.
- Don't waste time writing comments: the graders generally ignore them. The occasional brief comment that clarifies a segment of code is OK.
- Points are not deducted for inefficient code unless efficiency is an issue in the question.
- Most of the standard Java library methods are not included in the AP subset. They are accepted on the exam if you use them correctly. However, there is always an alternative solution that uses the AP subset and you should try to find it.
- Don't cross out an answer until you have written a replacement. Graders are instructed not to read anything crossed out, even if it would have gotten credit.
- Have some awareness that this section is graded by humans. It is in your interest to have the graders understand your solutions. With this in mind,
  - Use a sharp pencil, write legibly, space your answers, and indent correctly.
  - Use self-documenting names for variables, methods, and so on.

- Use the identifiers that are given in a question. You will lose usage points if you persist in using the wrong names.
- Write clear readable code. This is your goal. Don't write one obscure convoluted statement when you can write two short clear statements. The APCS exam is not the place to demonstrate that you're a genius.

HOW TO USE THIS BOOK 如何使用本书

Each chapter in the book contains a comprehensive review of a topic, multiple-choice questions that focus on the topic, and detailed explanations of answers. These focus questions help you to review parts of the Java subset that you should know. A few questions are not typical AP exam questions—for example, questions that test low-level details of syntax. Most of the focus questions, however, and all the multiple-choice questions in the practice exams are representative of actual exam questions.

You should also note that several groups of focus questions are preceded by a single piece of code to which the questions refer. Be aware that the AP exam will usually restrict the number of questions per code example to two.

In both the text and questions/explanations, a special code font is used for parts of the text that are Java code.

```
//This is an example of code font
```

A different font is used for pseudo-code.

< Here is pseudo-code font. >

A small number of optional topics that are not part of the AP Java subset are included in the book because they are useful in the free-response questions. Sections in the text and multiple-choice questions that are optional topics are clearly marked as such. Some sections are marked by a lightning bolt, as shown here in the margin. This means wake up! Here is a concept that is likely to be tested on the AP exam because it was emphasized in the new AP Computer Science labs.

Three complete practice exams are provided in the book. One exam is at the start of the book and may be used as a diagnostic test. It is accompanied by a diagnostic chart that refers you to related topics in the review book. The other two exams are at the end of the book. There are two additional exams on the optional CD-ROM provided with the book.

Each of the five exams has an answer key, complete solutions and explanations for the free-response questions, and detailed explanations for the multiple-choice questions. There is no overlap in the questions.

An answer sheet is provided for the Section I questions of each exam. When you have completed an entire exam, and have checked your answers, you may wish to calculate your approximate AP score. Use the scoring worksheet provided on the back of the answer sheet.

An appendix at the end of the book provides a glossary of computer terms that occasionally crop up on the exam.

A final hint about the book: Try the questions before you peek at the answers. Good luck!

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