Midterm Exam Topics

Topic Text Chapter

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Algorithmic Pseudo-code........... 2

Rate of Growth of Functions

and Asymptotic Notation........... 3

Divide-and-Conquer................ 4

The maximum-subarray problem.... 4.1

Strassen's matrix-mult algorithm 4.2

The substitution method......... 4.3

The recursion-tree method....... 4.4

The master method............... 4.5

Sorting Algorithms

Insertion-sort.................. 2

Merge-sort...................... 2

Heap-sort....................... 6.1-6.4

Quicksort....................... 7

Quicksort and Partition....... 7.1

Quicksort performance......... 7.2

Randomized Quicksort.......... 7.3

Sorting in Linear Time.......... 8

Lower bounds for sorting...... 8.1

Counting sort................. 8.2

Radix sort.................... 8.3

Bucket sort................... 8.4

Dynamic sets

Priority Queue Implementations

Binary Heaps.................. 6.5

Insert

Extract-Min

Elementary Data Structures...... 10

Stacks and Queues............. 10.1

Linked Lists.................. 10.2

Implementing Pointers & Objs.. 10.3

Representing Rooted Trees..... 10.4

Hash Tables..................... 11

Direct-address tables......... 11.1

Hash Tables................... 11.2

Collision Resolution

Chaining

Open Addressing........... 11.4

Binary Search Trees............. 12.1-12.3

Tree-Walk

Search

Insert

Delete

Minimum

Successor

Red-Black Trees................. 13

Red-Black Properties.......... 13.1

Rotations..................... 13.2

Insertion (and Fixup)......... 13.3

Deletion (and Fixup).......... 13.4

Possible Types of Exam Problems:

(1) Writing Pseudocode

(2) Runtime analysis of algorithms

(3) You should be able to trace the

algorithms and operations on the data

structures that we have discussed.

(4) Short answer

(5) "Prove that ..."

Especially questions from the Exercises and

Problems in the Assignments.

Materials allowed at exam: One 4"x6" note card

(or equivalent)

The following list contains examples of the

kinds of questions listed above.

The following is a list of Exercises and

Problems from the text. Questions like these

will appear on exams (in a slightly altered

form). If they fall into one of the

categories above, that is noted; the ones

that have appeared in class assignments are

marked with \*'s.

Page 14 Exercises:

1.2-2 (4) (but easier to calculate)

1.2-3 (4)\* (but easier to calculate)

Problems: 1-1 (first column) (4)\*

Pages 22-23 Exercises:

2.1-1 (3)

2.1-2 (1)

2.1-3 (1,5)

Page 29 Exercises:

2.2-3 (2)

Pages 37-39 Exercises:

2.3-2 (1)\*

2.3-5 (2)\*

Page 53 Exercises:

3.1-4 (5)\*

3.1-5 (5)\*

Page 60 Exercises:

3.2-3 (5)\*

3.2-7 (5)\*

Page 60 Problems:

3-1 parts a., b., and c. (5)\*

Page 74 Exercises:

4.1-1 (4)

Page 82 Exercises:

4.2-1 (3)

Page 87 Exercises:

4.3-1 (5)

Pages 92-93 Exercises:

4.4-1 (5)

4.4-2 (5)

Pages 96-97 Exercises:

4.5-1 (4)

4.5-3 (5)

Pages 153-154 Exercises:

6.1-1 (4)

6.1-2 (5)\*

6.1-5 (4)

6.1-6 (4)

Page 159 Exercises:

6.3-1 (3)

6.3-2 (4)

6.3-3 (5)\* (too hard for exam)

Pages 160,162 Exercises:

6.4-1 (3)

Pages 164-166 Exercises:

6.5-1 (3)

6.5-2 (3)

6.5-3 (1)\* (In Part 1, Assignment 4)

Pages 173-174 Exercises:

7.1-1 (3)

Page 178 Exercises:

7.2-1 (5)

7.2-2 (2)

7.2-3 (5)

7.2-4 (5)

Pages 184-185 Exercises:

7.4-2 (2)\* (too hard for exams)

7.4-4 (2)\* (too hard for exams)

Pages 193-194 Exercises:

8.1-1 (4)

8.1-2 (5) (in Ex. 3.2-3 above)

Pages 199-200 Exercises:

8.3-1 (3)

Page 204 Exercises:

8.4-1 (3)

Pages 240-241 Exercises:

10.2-1 (4)

10.2-2 (5)

10.2-3 (5)

Pages 248-249 Exercises:

10.4-4 (4)

Page 261 Exercises:

11.2-2 (3)

Page 277 Exercises:

11.4-1 (3)

11.4-2 (1)

Page 289 Exercises:

12.1-1 (4)

12.1-2 (4)

12.1-4 (1)

12.1-5 (5)\*

Pages 293-294 Exercises:

12.2-1 (4)

12.2-2 (1)\*

12.2-3 (1)\*

12.2-5 (5)\*

Trace BST insertion/deletion (3)

Pages 311-312 Exercises:

13.1-2 (3,4 )

13.1-4 (4)\*

13.1-5 (5)\*

13.1-6 (4)\*

13.1-7 (4)

Pages 313-314 Exercises:

13.2-1 (1)\* (In Assignment 8, Part 1)

Page 322 Exercises:

13.3-1 (4)

13.3-2 (3) (trace RB-tree insertion)\*

13.3-3 (4)

Page 330 Exercises:

13.4-3 (3) (trace RB-tree deletion)\*

13.4-5 (4)