

Midterm Review

Exam Details

- **Date:** Next week
- **Start time:** 6:00 pm sharp
- **Duration:** 90 minutes

Examination Rules

The exam is not closed book, but it is not open book either ...

- you are allowed a single 8.5"x11" sheet for formulas etc
 - (you will have to hand this in with your exam)
- during the exam you **cannot share notes with other students**
- no electronic devices (no calculators, phones, MP3 players etc)
- no books or other notes (except your single sheet)

Types of Questions

- No definitions
- No pure math questions
- **Focus is problem solving, deriving and applying algorithms**
- There will be multi-part questions
- You **may** be asked things like this ...
 - determine the efficiency of an algorithm
 - devise an algorithm to solve a small problem
 - E.g.: the textbook exercises, or the exercises we have done in class
 - solve a simple problem using a specific technique
 - E.g.: devise a decrease-and-conquer algorithm that solves ...
 - apply known algorithms to a set of data
 - i.e.: show that you know how an algorithm works

Chapters Covered

- 1.1... introduction
- 2.1-2.3 ... analysis of non-recursive algorithms
- 3.1 ... various sorts / brute force
- 3.2 ... sequential search + string matching / brute force
- 3.4 ... exhaustive search problems / brute force
- 4.1 ... Insertion Sort / decrease and conquer
- 4.3 ... generating permutations / decrease and conquer
- 4.4 ... binary search / decrease and conquer
- 5.1 ... Merge sort / divide and conquer
- 6.1 ... Presorting / transform and conquer
- 6.4 ... Heaps / transform and conquer
- 7.1 ... Sorting by counting / space-time tradeoffs
- 7.2 ... Input Enhancement in String Matching/ space-time tradeoffs

Analysis Topic

- finding/counting basic operations
 - you will have to do this specifically on the exam
- setting up and solving summations to get closed form
 - you will have to do this on this exam
- efficiency classes
 - you should understand the efficiency classes and be able to state which class an algorithm is a member of; focus is on worst case (Big-O)

Type of Problems

- We have covered a variety of types of problems. Some of the main ones include:
 - sorting
 - searching
 - string matching
 - permutations
 - counting
 - mapping
 - distinct element
 - kth smallest element
 - finding max, min

Common Exam writing mistakes

1. Just **duplicating something** from your hint sheet
 - there are no correct answers that can be copied from your hint sheet
2. Incomplete, messy, unclear diagrams or code
 - if you do not write it down in a clear and concise manner **you will not get marks**
3. Not reading the exam before you begin.

Common Exam writing mistakes

Not Using Pseudocode

This is **pseudocode**

for each customer c in customers
doStuff(c)

This is **java**

```
Iterator iter = customers.iterator();  
while (iter.hasNext())  
{  
    Customer c = (Customer)iter.next();  
    c.doStuff();  
}
```

Common Exam writing mistakes

Not Showing Your Work

Not showing your work ... ie ... just putting down an answer with no supporting work
for example:

Question: "Sort A[3,2,4,5,7] using a brute force algorithm. Show your work."

Poor Answer: 2, 3, 4, 5, 7

Better – Show each iteration (like lab)

Question: "What is the worst case efficiency class for your algorithm Justify your answer."

Poor Answer: $O(n)$

Better – Explain in words why it's $O(n)$

Common Exam writing mistakes

Not Writing Detailed Pseduocode

"high-level pseudocode"

Insert(item)

 insert item into last empty
 location

 while item > parent AND item is
 not root

 swap item with parent

"detailed pseudocode"

algorithm: sortdisks($A[1..2n]$)

 for $i \leftarrow 1$ to n

$w \leftarrow 2*i$

 for $b \leftarrow w-1$ to i

 swap($A[w]$, $A[b]$)

$w \leftarrow w-1$

Good luck!