

Topics for CSCI 151 Exam 1

A. Java and Programming Techniques

- Types
- Classes
- Inheritance
- Generics
- Abstract classes and interfaces
- Exceptions
- Recursion
 - a) Writing recursive methods
 - b) Dynamic Programming
 - c) Loop + Stack (no coding on this but you should know the idea)

B. Data Structures

- ArrayLists
- Linked Lists and other linked structures
- Stacks
- Queues

C. Algorithms

- Big-Oh etc. notation Upper bounds and lower bounds
- Algorithms analysis
- BubbleSort, SelectionSort, InsertionSort

There will not be any LONG programs to write, but you will be asked to write short pieces of code.

Typical questions:

- What is the difference between an abstract class and an interface? Why would we use an abstract class? Why would we use an interface?
- Here is a recursive method. Convert it into a dynamic program.
- Consider a `Queue<E>` implemented as a linked structure. Draw a picture (boxes and arrows) of an empty queue and a queue to which you have added first the value 2, then the value 13, where the base class E is Integer. Now give code for the method `public void enqueue(E value)` that goes with your picture. Your pictures should label any variables you use.
- Here is a loop. Give a Big-Oh estimate of its worst-case running time.
- Imagine a processor that has a bunch of jobs to work on, but can only handle one at a time. It keeps the waiting jobs in a structure that I'll call its "wait list". Over and over it takes the next job out of its wait list, works on it for a set amount of time, and if it isn't done it puts the job back in the wait list. Meanwhile, new jobs get added to the wait list as

they come in. Explain what the difference is between using a stack and using a queue for the wait list.