Do Not Turn This Page Until Directed to do so.

Name: _____

You have 75 Minutes minutes from the start of class to complete this exam.

You **are** allowed:
One 8.5x11 inch Page of Notes (Front and Back)

You **are not** allowed to use:
Your Book
Your Course Notes
Your Friends
Anyone Else
Your phone or any other devices

If you fail to turn in your test before leaving the room, check your cell phone, or you use any resource other than your card of notes, your test will be taken and you will be **given a grade of 0**.

Your note card must be submitted with the test.

Read the instructions carefully and answer each question as completely as you can.

There will be no talking during the test. This also means that I will not answer questions. Do what makes sense for each question.

Question	Points	Score
1	4	
2	4	
3	4	
4	4	
5	4	
6	4	
7	4	
8	4	
9	4	
10	4	
11	4	
12	4	
13	4	

Question	Points	Score
14	4	
15	4	
16	4	
17	4	
18	4	
19	4	
20	4	
21	4	
22	4	
23	4	
24	4	
25	4	
Total:	100	

Points: _____

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1. (4 points) What is a major limitation of using an array to implement a queue? }

2. (4 points) What is the basic process for inserting into a binary search tree?

3. (4 points) Suppose you have a stack (initially empty) with standard **push(int e)**, **pop()**, and **peek()** methods. What are the values in the stack after the following operations were executed: **pop(), push(8), push(9), push(11), peek(), push(4), pop(), push(2), pop(), peek(), pop()**

    A. null

    B. 2

    C. 5

    D. 3, 5

4. (4 points) Why are "pretty" (complete - full and balanced) binary search trees so handy?

5. (4 points) Suppose I have a binary tree that looks like the image below. What is the correct ordering of values returned with a pre-order traversal of this binary tree?

6. (4 points) I appreciate a well organized gear room with a bin for fishing gear (one half for fly, other for spin), camping gear (summer bag and tent, winter bag and tent, ultralight bag and tent), parts (ski, fishing, bike, . . .), . . . Believe me, it keeps going on. What sort of data structure should represent the gear room that would best aid me in locating a specific thing I am looking for?

7. (4 points) I am writing a printer management system for the College of Science and engineering. for any one printer/copier the print jobs that come in are ordered both by time of arrival and by who submitted the job. In the latter case, faculty come first followed by graduate students followed by undergraduate students, but everyone is preempted by a person making a copy at the machine itself. What data structure should I use to handle this situation?

8. (4 points) I am building an application that allows for the collaborative estimation of size for a user story. To do this, each software engineer gets one bid and then it moves on to the next in round-robin fashion. The app needs to be designed for teams of varying sizes. Which data structure should I use to best represent the bidding process?

9. (4 points) I am currently employed by a company working on what they believe is the next generation of web browser. But, just like every web browser it needs a component to represent the history of the user's browsing. This means that the user's current view (from any one tab) can change backwards and forwards based on pages they have visited in their recent history. What underlying data structure would best represent this feature? }

10. (4 points) I am developing a simulation for Delta Airlines, which simulates the planing and de-planing of passengers from an airplane. At present, I am concerned with modeling the most basic method of people leaving a plane. In the most basic form, passengers enqueue and dequeue from the front. Which data structure would best represent this approach?

11. (4 points) I am currently developing a simulation for Delta Airlines to model the planing and de-planing of passengers at the airport. At this point I am interested in modeling the optimal (as in fastest) approach for loading and unloading. Which data structure would be best to model the plane (computationally), if passengers are able to enter and leave from the front and back of the plane?

12. (4 points) I have decided that the whole professor thing is far too much work, and have decided that I need to change careers towards delivering packages. Assuming that I have up front knowledge of where items are to be delivered, and have calculated the optimal route, and I load the truck from back to front (closer to the driver) for optimal package delivery. What data structure would I use to represent the ordering of packages in the truck?

13. (4 points) What is a major limitation of using an array to implement a tree?

14. (4 points) Which growth function would be best for an algorithm to have for very large values of n?

15. (4 points) What can we say about the following line of code:

```java
Mountain m = new Huntington();
```

16. (4 points) What is the difference between an Interface and an Abstract Class?

17. (4 points) In Java, an `IllegalArgumentException` is a type of exception which must be declared in the throws clause of a method declaration.

18. (4 points) When handling an exception using a try {} catch (...) {} finally {} block, the statements in the finally block will always be executed regardless of the code in the try or catch.

19. (4 points) A well designed recursive method is one which?

20. (4 points) I have some data that I know nothing about (other than it can be sorted). I need to make sure that work case running time is as good as I can make it. I really don't care about best case or average case, I just need the worst case to be as good as possible. Which sorting method should I use?

21. (4 points) I have to sort a large number (>100,000) of integers. Real world running time is most important to me, all things being equal, I also want to be space efficient as well. Which sorting method should I use?

22. (4 points) For each iterative approach to a problem and equal recursive approach can be developed, and vice versa.

23. (4 points) Both Linear Search and Binary Search have the same Best Case running time?

24. (4 points) I have some data to store, what is a good reason to choose to store it in a linked list?

25. (4 points) I have some data to store, what is a good reason to choose to store it in an array?

End of Test