**CS311 : Substitution for a Midterm – Read PART 3 SUMMARY first.**

**Fill out this table first by re-reading the notes:**

B(N) W(N) in terms of comparisons

Sequential Search 1 comparison N comparisons

Binary Search 1 comparison log(N) comparisons

Selection Sort B(N)=W(N)=N^2 comparisons

Bubble/Insertion Sort N^2 comparisons N-1 comparisons

Quick Sort N^2 comparisons N log(N) comparisons

Merge Sort B(N)=W(N)=N log (N). comparisons

F(N) in terms of comparisons

Search unordered list. theta(N) comparisons

Search ordered list. theta(Log N) comparisons

Sort by fix one pair per comparison theta( N^2 )comparisons

Sort theta (NlogN) comparisons

**You should try these questions to be ready for the final exam. No need to submit this but I would be happy to check your answers if you email it to me.**

**But be able to answer pretending that these are job interview questions!**

**You must have collected all ҉҉ boxes and re-read them!!!**

1. **Can someone do faster than O(logN) for ordered list search? Why or why not?**
2. **Can someone do faster than O(N) for unordered list search? Why or why not?**

**3) Can someone do faster than O(N^2) for comparison based sorting that fixed one bad pair at a time?**

**Why or why not?**

1. **Can someone do faster than O(NlogN) for comparison based soring? Why or why not?**

**5) Discuss Space vs. Time issue related to arrays vs. vectors.**

**Vector:**

**Time : It takes a lot time when you add a new slot/ add an element ; a larger block is allocated in the heap which means there is a lot of work done behind the screen when you add a new slot**

**Space : it shrinks and grows; more flexibility**

**Array:**

**Time: it takes less time to look for an element because you can just index it**

**Space:**

**6) Discuss Space vs Time issue related to Quick Sort vs. Merge Sort.**

**7) Can you do stack1 == stack2 in HW1P1 client? Why or why not?**

**8) Can you do stack1 = stack2 in HW1P1 client? Why or why not?**

**No because the ‘=’ sign can’t be read , and it won’t know how to compare**

**9) Can you correctly pass a linked list by value to a function or return a linked list by value from a function without writing a copy constructor? Why or why not?**

**10) B is the bottom level of a binary tree that is perfectly triangular. N is the number of nodes.**

**B+1 = the number of levels = log \_\_\_\_\_\_\_ ? Try drawing a tree with 7 nodes to verify your answer.**

**11) Write C++ code to produce a dangling pointer.**

**12) Write C++ code to produce a garbage cell.**