CS311 Yoshii - HW2 PART 1– Algorithm Analysis Warm Up (Based on Week3)

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DUE: Week 5 Monday

TOTAL: 20 points Your score is:

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Date Turned in: 9/26/16

Purpose: To demonstrate your understanding of analyzing algorithms. Starting with this assignment, only the testing needs to be on empress.csusm.edu

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A) Review Questions [1 pt per question = 10pts] Your score is:

Type your answers here

1) What does W(n) mean? (W? N? W(N)?)

W(n) means the worst case. W means the worst case scenario, the n means the number of inputs and W(n) means the number of basic operations for the worst case of the given size.

2) A. What is W(n) of sequential search?

The W(n) of a sequential search would be n.

B. When does it happen?

It happens when you have to look at all of the elements in the search because the element was not there.

3) What does B(n) mean? (B?, N?, B(N)?)

B(n) means the best case scenario. The b means the best case, the n means the number of inputs and B(n) means the number of basic operations for the best case scenario of the given size.

4) A. What is B(n) of sequential search?

B(n) of a sequential search would be 1.

B. When does it happen?

The B(n) of a sequential search is when the element that is being searched for is at the beginning of the list.

5) Why is A(n) difficult to determine for the real world problems?

Its difficult to find A(n) or the average case because not all cases are equally likely to happen. It is also very difficult to find probablilities of each case happening.

6) Why don't we care about constants and lesser terms in a time complexity expression?

We are not interested in constants and lesser terms in a time complexity expression we only care about the growth rate as N increases.

7) Prove that 3n^2 + 4n = O(n^2) as I did in the notes.
8) Binary search corresponds to the shortest binary decision tree.

Sequential search corresponds to a tallest tree.

9) Thus, the fastest ordered list search does W(n)=Theta($\log_2 n$) comparisons.
10) But, the fastest unordered list search does W(n)=Theta(n) comparisons.

B) Programming Binary Search [10 pts] Your score is:
No ADT; Just one source code file - Run my solution program first

Using Notes-3B.doc, implement and test the binary search function.
The pseudo code in the file does not take care of the cases where the element is not found. You must fix the code to take care of such cases and return -1.

Your main() will fill an array of 10 slots with integers 1 3 5 7 9 11 13 15 17 19
It will then ask the user to enter a number to look for.
It will then call binarySearch and display the returned result.
e.g. "The number was found in position 5"

Required Testing and expected results: (must test in this order!;)
1. **Find 1 in position 1 (It is not position 0!)**
2. **Find 19 in position 10**
3. **Find 5 in position 3**
4. **Find 17 in position 9**
5. **Find 21 fails**
6. **Find 0 fails**

7. Find 6 fails

NOTE: Do you think I listed all possible cases? Always ask yourself if there are other cases you should test to make sure your program is bug free.

Q. State of your program [2pts]

- **Does your program compile without errors? If not, describe.yes**
- **List any bugs you are aware of, or state "No bugs": no bugs**

Submit these 3 files:

1. This assignment sheet with your answers.

2. Binsearch.cpp: The source code file for the program with good comments.

3. Test: Script of the compilation and test results on Empress.