If this lab is an Individual assignment, you must do all coded programs on your own. You may ask others for help on the language syntax, but you must organize and present your own logical solution to the problem. No lab is complete until the MyClass submits the signed pledge form associated with that lab. I realize that no coded programs will be graded until I turn in the sign & pledge form associated with that program; any late penalties will continue to compound until the pledge form is submitted.

If this lab is a team assignment, both team members may share logic as they program side by side on their own computers. Each person must type all of his/her own code as part of the learning process. Team assignments are never to be “You do this portion and I’ll do that portion” or “You do this lab and I’ll do the next lab”.

Some of the lab assignments will have short answer questions. These short answer questions will be spot checked and graded for completion, but not checked for accuracy. Once these labs are graded and returned, I encourage you to compare answers with another class member who has also had the lab graded and returned.

These short answer questions will be spot checked and graded for completion, but not checked for accuracy. I encourage you to form a study group; get together to prepare for exams. Once your homework and labs are graded and returned, I encourage you to compare answers others in your study group who have also had the lab, or homework, graded and returned. You may not share this work outside the class; it is a violation of academic integrity to share your work with others outside the class. It is a violation of academic integrity to receive the software engineering work completed by other students.

You must answer at least 90% of the short answer questions correctly!

I/We realize that the penalty for turning in work that is not my own, or assisting others in doing so, can range from an "F" in the class to dismissal from Trinity University.

I/We realize that the penalty for turning in work that is not my own, or assisting others in doing so, can range from an "F" in the class to dismissal from Trinity University. I realize that it is a violation of academic integrity to share any portion of this lab with any person (outside my 2320 team & professor)!

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**OOP - 9 DA-BinTree + Review**

**Print Only Pages 1-7**

**Individual Assignment**

**15 Points**

### General Binary Tree Info

1] ____________________ The TreeHeader has one pointer; it is called the ___?__.

2] ____________________ A tree, that has one node at each level, is called a ___?___ tree.

3] ____________________ A tree, that can be expressed in “no fewer levels”, is called a ___?___ tree.

4] ____________________ A tree, whose lowest level is completely full, is called a ___?___ tree.

5] List all of the functions, in the Binary Tree application, that can be copied from your linked list application and used with little or no modifications:

   C__________________________ D__________________________
   C__________________________ H__________________________
   C__________________________ C__________________________
   G__________________________ F__________________________
   V__________________________ H__________________________
   V__________________________ N__________________________
   E__________________________

6] _________ {T/F} We are able to the same DLNode for both Binary Trees and Doubly Linked Lists.
7] Traversal For The Tree in Figure A Is _?_.

8] Traversal For The Tree in Figure A Is _?_.

9] Traversal For The Tree in Figure A Is _?_.

Figure A

Figure B

10] Traversal For The Tree in Figure B Is _?_.

11] Traversal For The Tree in Figure B Is _?_.

12] Traversal For The Tree in Figure B Is _?_.

Figure C

13] Traversal For The Tree in Figure C Is _?_.

14] Traversal For The Tree in Figure C Is _?_.

15] Traversal For The Tree in Figure C Is _?_.

16] A BALANCED TREE is a tree that ____________________________

17] A COMPLETE TREE is a tree that tree a tree whose ____________________________

18] A BALANCED TREE is a tree that ____________________________
Software Engineering Questions

1] _________________. If it takes 130.5 seconds to read 50,000 records, then the number of records that can be read in 1 second = _?_ (xxx.). Show Your Work. Whole Number Of Records!

2] _________________. If it takes 6.1 seconds to read 4,000 records, then the number of records that can be read in 1 second = _?_ (xxx.). Show Your Work! Whole Number Of Records!
Implementation: Unordered List

1,200,000 Records – 400 R/W Per Second – Record Size = 20,000 Bytes

Keep The No Of Valid Records in Record 0 of the File!
My Answers Below Include Those Reads & Writes Necessary To Keep Record 0 Accurate
All Calculations Must Be 3 Digits To The Right Of Decimal Point – No Formulas!

1] ____________________________ It would take _?_ minutes (xxx.xxx) to sequentially read through all of the records. Show Your Work!

2] ____________________________ The Worst Case Sequential Search Time = _?_ minutes (xxx.xxx). Show Your Work!

3] ____________________________ The Average Sequential Search Time = _?_ minutes (xxx.xxx). Show Your Work!


5] ____________________________ The Average Add Time = _?_ minutes (xxx.xxx). Show Your Work!

6] ____________________________ We know the location. The Worst Delete Time = _?_ seconds (xxx.xxx). Show Your Work!

7] ____________________________ We know the location. The Average Delete Time = _?_ seconds (xxx.xxx). Show Your Work!

8] ____________________________ We Don’t know the location. The Average Delete Time = _?_ seconds (xxx.xxx). New Problem! Show Your Work!

9] ____________________________ Ryan is the Manager For Sporting Goods. Assume that there are 12,000 Sporting Goods records. Ryan needs an alphabetical listing of all of the Sporting Goods Items. The Time Required to collect and organize this data would be about _?_ minutes. Calculate the time to sort the data as N Log N. Show Your Work!
Implementation: Ordered List
1,200,000 Records – 400 R/W Per Second – Record Size = 20,000 Bytes
100 Header Nodes - Assume That Each List Has The Same Number Of Nodes

Keep The No Of Valid Records in Record 0 of the File!
My Answers Below Include Those Reads & Writes Necessary To Keep Record 0 Accurate
All Calculations Must Be 3 Digits To The Right Of Decimal Point – No Formulas!

1] ______________________.________ Each List would have _?_ Records.
2] ______________________.________ It would take _?_ minutes (xxx.xxx) to sequentially read through all of the
   records one list . Show Your Work!

1] ______________________.________ The Worst Case Linear Search By Key Time = _?_ seconds (xxx.xxx) . Show Your Work!
2] ______________________.________ The Average Case Binary Search By Key Time = _?_ seconds (xxx.xxx) . Show Your Work!

3] ______________________.________ The Worst Case Add Time = _?_ minutes (xxx.xxx) . Show Your Work!
4] ______________________.________ The Average Case Add Time = _?_ minutes (xxx.xxx) . Show Your Work!

5] ______________________.________ We Know The Location. The Worst Case Delete Time = _?_ minutes
   (xxx.xx) . Show Your Work!
6] ______________________.________ We Know The Location. The Average Case Delete Time = _?_ minutes
   (xxx.xx) . Show Your Work!
7] ______________________.________ We Don’t know the location. The Average Delete Time = _?_ minutes
   (xxx.xxx) . Show Your Work!
8] ______________________.________ Ryan is the Manager For Sporting Goods. Assume that there are 12,000
   Sporting Goods records. Ryan needs an alphabetical listing of all of the Sporting Goods Items. The Time Required
to collect and organize this data would be about _?_ seconds. Calculate the time to sort the data as N Log N.
   Show Your Work!
Implementation: Direct Access Double-Linked List

1,200,000 Part Records For Sears – 400 R/W Per Second – Part Record Size = 20,000 Bytes
100 Headers – Records Are Evenly Distributed Among The 100 Headers

Keep The No Of Valid Records in Record 0 of the File!
My Answers Below Include Those Reads & Writes Necessary To Keep Record 0 Accurate
All Calculations Must Be 3 Digits To The Right Of Decimal Point – No Formulas!

1] ______________________ How many nodes would there be in each List? Show Your Work!

2] ______________________.______ It would take _?_ seconds (xxx.xxx) to sequentially read through all of the records on one list. Show Your Work! Hint: Don't forget RH – Read the Header!

3] ______________________.______ We are looking for an item in Sporting Goods. The Worst Case Search Time = _?_ seconds (xxx.xxx). Show Your Work!

4] ______________________.______ We are looking for an item in Sporting Goods. The Average Case Search Time = _?_ seconds (xxx.xxx). Show Your Work!

5] ______________________.______ We are adding an item in Sporting Goods. The Worst Case Add Time = _?_ seconds (xxx.xxx). Assume that GetNode is (1R +1W). Show Your Work!

6] ______________________.______ We are adding an item in Sporting Goods. The Average Case Add Time = _?_ seconds (xxx.xxx). Assume that GetNode is (1R +1W). Show Your Work!

7] ______________________.______ We are deleting an item in Sporting Goods. The Worst Case Delete Time = _?_ seconds (xxx.xxx). Assume that FreeNode is (2R +2W). Show Your Work!

8] ______________________.______ We are deleting an item in Sporting Goods. The Average Case Delete Time = _?_ seconds (xxx.xxx). Assume that FreeNode is (2R +2W). Show Your Work!

9] ______________________.______ Ryan is the Manager For Sporting Goods. He wants an alphabetical listing of all of the Sporting Goods Items. Problem #2 in this section tells us how long it would take to collect the Data for Ryan in this DA_DLList model. If we tried to collect Ryan’s data from the Ordered list, it would take _?_ seconds. Show Your Work!
Implementation: Binary Tree
1,200,000 Records – 400 R/W Per Second – Record Size = 20,000 Bytes
100 Header Nodes - Assume That Each Tree Has The Same Number Of Nodes
Assume That The Tree Is Balanced

Keep The No Of Valid Records in Record 0 of the File!
My Answers Below Include Those Reads & Writes Necessary To Keep Record 0 Accurate
All Calculations Must Be 3 Digits To The Right Of Decimal Point – No Formulas!

1] ______________________ How many nodes would there be in each Tree? Show Your Work!

2] ______________________ It would take _?_ seconds (xxx.xxx) to sequentially read through all of
the records on one tree – (same as Linked List if non-recursive) . Show Your Work! Hint: Don’t forget RH – Read the
Header!

3] ______________________ We are looking for an item in Sporting Goods. The Worst Case Search
Time = _?_ seconds (xxx.xxx) . Show Your Work!

4] ______________________ We are looking for an item in Sporting Goods. The Average Case Search
Time = _?_ seconds (xxx.xxx) . Show Your Work!

5] ______________________ We are adding an item in Sporting Goods. The Worst Case Add Time  =
_?_ seconds (xxx.xxx) . Assume that GetNode is (1R +1W). Show Your Work!

6] ______________________ We are adding an item in Sporting Goods. The Average Case Add Time  =
_?_ seconds (xxx.xxx) . Assume that GetNode is (1R +1W). Show Your Work!

7] ______________________ Ryan is the Manager For Sporting Goods. He wants an alphabetical listing
of all of the Sporting Goods Items. Problem #2 in this section tells us how long it would take to collect the Data for
Ryan in this DA_DLList model. If we tried to collect Ryan’s data from the Binary Tree, it would take _?_ seconds.
Show Your Work!