



Your Name: \_\_\_\_\_  
ID#: \_\_\_\_\_

TA's Name: \_\_\_\_\_  
Section #: \_\_\_\_\_

### SOLUTION: Take Home: Quiz 6 (15 pts) - Binary Search Trees

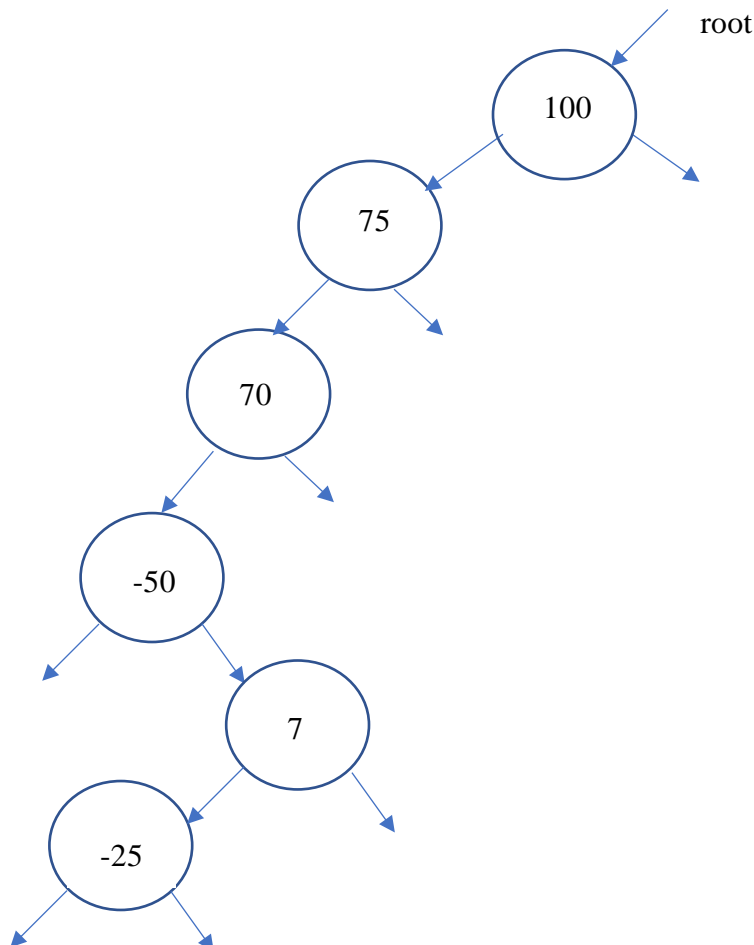
Using Blackboard Learn <https://learn.wsu.edu/webapps/login/> submit your quiz. You will submit your assignment in the **lab** Blackboard space. Under the "Content" link navigate to the "Quiz Submissions" folder and upload your solution to the appropriate "Quiz" space. You must upload your solution, through an attachment, as <your last name>\_quiz6.pdf by the due date and time.

1. (3 pts) What is a binary search tree (BST)? Describe the properties of a BST in your answer.

**A BST is a nonlinear data structure with the following properties:**

**All elements stored in the left subtree of a node whose value is  $K$  have values less than  $K$ . All elements stored in the right subtree of a node whose value is  $K$  have values greater than (or equal) to  $K$ . That is, a node's left child must have a key less than its parent, and a node's right child must have a key greater than (or equal to) its parent.**

2. (6 pts - 1 pt/number) Given the following sequence of numbers: 100, 75, 70, -50, 7, -25. If the numbers are inserted into a BST in the sequence provided, then what would the tree look like? Draw a diagram for the BST. Be sure to show both branches of a given node.





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3. (6 pts) Fill-in-the-blank - Using the BST constructed in question (2), answer the following questions:

i. (1 pt) How many node comparisons are required to find the number -25? 6

ii. (1 pt) How many children does the node containing the number 100 have? 1

iii. (1 pt) What is the *height* of the tree? 5 (# of edges from leaf to the root in the longest path)

iv. (1 pt) What is the *depth* of the node with value 7? 4 (# of edges from root to the node with value 7)

v. (1 pt) How many *leaf* nodes exist in the tree? 1 (-25)

vi. (1 pt) At what *level* is the root node? 0