**Take Home: Quiz 6 (15 pts) – Binary Search Trees**

Using Canvas <https://canvas.wsu.edu/>, please submit your solution to the correct quiz folder. Your solution should be a .pdf file with the name <your last name>\_quiz6.pdf and uploaded. To upload your solution, please navigate to your correct Canvas ***lab*** course space. Select the “Assignments” link in the main left menu bar. Navigate to the correct quiz submission folder. Click the “Start Assignment” button. Click the “Upload File” button. Choose the appropriate .pdf file with your solution. Finally, click the “Submit Assignment” button.

1. **(2 pts)** What is a binary search tree (BST)? Describe the properties of a BST in your answer. Also, list one real-world example where a BST could be applied.

Answer:

Binary search tree is a hierarchical data structure. The first property of it is that it is a binary tree whose every node has at most two children (left and right). Then, the main property of a BST is that every node has a value that is greater than all elements stored in left subtree, and less than right subtree’s (maybe equal, if the tree allows duplicated node values). Besides, both subtrees are also BST.

One real-world application of a BST is that it helps many 3D game engines determine which objects should be rendered in a 3D world.

1. **(6 pts – 1 pt/number)** Given the following sequence of numbers: 35, 50, 5,

-5, 10, -1. 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.

1. **(7 pts)** Fill-in-the-blank - Using the BST constructed in question (2), answer the following questions:

**i. (1 pt)** At what *level* is the node containing number -5? \_\_2\_\_

**ii. (1 pt)** How many children does the node containing the number 10 have? \_\_\_\_0\_\_\_\_

**iii. (1 pt)** What is the *height* of the tree? \_\_\_\_3\_\_\_\_

**vi. (1 pt)** What is the *height* of the node containing 50? \_\_\_0\_\_\_\_

**iv. (1 pt)** What is the *depth* of the node with value -1? \_\_\_\_3\_\_\_\_

**v. (1 pt)** What is the *depth* of the root node? \_\_\_0\_\_\_\_

**vi. (1 pt)** What is the highest *degree* of a BST? \_\_\_2\_\_\_\_\_