**CS302: Homework 4**

Now we’re branching out.

**Exercise 1.**

The assignment here was a simple task but a lengthy implementation. Trying to put together something in the source code required use of both the slides and book. The end goal was to generate 100 random numbers from 1-200 and insert them into a binary search tree. From that, the tree height would be determined, and different methods of traversals could be demonstrated.

Height of tree: 15

Preorder Traversal

66 46 34 21 16 13 1 4 5 18 19 30 26 21 22 29 43 35 36 44 49 46 48 47 61 58 59 60 65 65 162 156 144 138 117 78 67 66 70 68 67 70 73 76 111 92 80 83 93 104 103 98 95 94 96 103 103 110 114 115 114 127 126 118 117 119 125 125 132 131 135 138 139 139 155 150 146 151 157 159 158 159 159 179 168 165 166 166 178 175 170 194 184 179 191 187 187 193 191 195

Inorder Traversal

1 4 5 13 16 18 19 21 21 22 26 29 30 34 35 36 43 44 46 46 47 48 49 58 59 60 61 65 65 66 66 67 67 68 70 70 73 76 78 80 83 92 93 94 95 96 98 103 103 103 104 110 111 114 114 115 117 117 118 119 125 125 126 127 131 132 135 138 138 139 139 144 146 150 151 155 156 157 158 159 159 159 162 165 166 166 168 170 175 178 179 179 184 187 187 191 191 193 194 195

Postorder Traversal

5 4 1 13 19 18 16 22 21 29 26 30 21 36 35 44 43 34 47 48 46 60 59 58 65 65 61 49 46 66 67 68 76 73 70 70 67 83 80 94 96 95 98 103 103 103 110 104 93 92 114 115 114 111 78 117 125 125 119 118 126 131 135 132 127 117 139 139 138 138 146 151 150 155 144 158 159 159 159 157 156 166 166 165 170 175 178 168 179 187 187 191 193 191 184 195 194 179 162 66

The difficult part of the assignment came from working with the provided header file, but the lecture slides and book proved to be a useful resource. There are some places where I chose to deviate from the provided file for my own sanity and so that the code would compile (two very closely linked things).

I eliminated the use of the shared\_ptr implementations. This not only made the program work but the code was much easier to understand and write.

Another large deviation was my combination of BinaryNodeTree.h functions into BinarySearchTree.h as their member functions varied minimally. There were only a few I had to include that were not already implemented and created less headaches.

One dumb mistake made, which caused over 100 errors in compilation was writing template<classItemType> above the BinarySearchTree class declaration instead of template<class ItemType>.

An added benefit of doing this assignment was a heavy refresher on pointers and the usage of -> with them. There were things I caught before initial compilation that would have made an ungodly amount of errors.