CS315 Programming Assignment 2 Writeup

Compile Instructions
To compile the program, unzip the file and open the command prompt. From the command line, change the directory to where the unzipped files are located and type in the command: python3 main.py

Supplementary Methods
The search method was tested by searching for values that existed in the dataset (0 to 128 inclusive) and that did not exist in the dataset (-1, 129). If the value existed in the BST, it returned the node object that contained the value. Otherwise, it would return None. The max and min methods were tested by passing all three BSTs (resulting from 'test1.csv', 'test2.csv', and 'test3.csv') into the method. It returned 128 and 0 for all the BST when max and min methods were used respectively.

Deleting from a Binary Search Tree
The delete method was tested using 4 different test cases on BST resulting from 'test1.csv' where the values 32, 64, 96, and 128 were deleted one after another. To verify that it worked, the inorder traversal of the BST was printed following each call to the delete method. This is what the output looked like:

```
Inorder traversal before any deletion:
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72
73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113
114 115 116 117 118 119 120 121 122 123 124 125 126 127 128
Inorder traversal after deleting 32 from BST resulting from
'test1.csv'
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
115 116 117 118 119 120 121 122 123 124 125 126 127 128
Inorder traversal after deleting 64 from BST resulting from
'test1.csv'
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60 61 62 63 65 66 67 68 69 70 71 72 73 74
75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115
116 117 118 119 120 121 122 123 124 125 126 127 128
Inorder traversal after deleting 96 from BST resulting from
'test1.csv'
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60 61 62 63 65 66 67 68 69 70 71 72 73 74
```

```
75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 97 98
99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116
117 118 119 120 121 122 123 124 125 126 127 128
Inorder traversal after deleting 128 from BST resulting from
'test1.csv'
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60 61 62 63 65 66 67 68 69 70 71 72 73 74
75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 97 98
99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116
117 118 119 120 121 122 123 124 125 126 127
```

Hence, from the above output, it can be seen that values are getting deleted and thus the delete method works.

Traversals
The traversal methods (preorder, postorder, and inorder) were tested by simply calling them on the BST resulting from 'test1.csv'. This is what the output looked like for each:

```
Preorder traversal for BST resulting from 'test1.csv':
102 84 58 18 7 1 0 2 3 6 4 5 8 9 13 12 11 10 15 14 17 16 20 19 21 48
30 22 24 23 28 26 25 27 29 32 31 45 40 37 35 33 34 36 39 38 44 42 41
43 47 46 54 49 51 50 53 52 56 55 57 71 63 62 60 59 61 66 65 64 70 67
69 68 81 75 74 73 72 76 80 77 78 79 82 83 88 86 85 87 91 89 90 93 92
99 95 94 97 96 98 101 100 105 103 104 123 120 113 107 106 111 108 110
109 112 114 119 118 117 115 116 121 122 128 125 124 127 126
```

```
Postorder traversal for BST resulting from 'test1.csv':
0 5 4 6 3 2 1 10 11 12 14 16 17 15 13 9 8 7 19 23 25 27 26 29 28 24 22
31 34 33 36 35 38 39 37 41 43 42 44 40 46 47 45 32 30 50 52 53 51 49
55 57 56 54 48 21 20 18 59 61 60 62 64 65 68 69 67 70 66 63 72 73 74
79 78 77 80 76 75 83 82 81 71 58 85 87 86 90 89 92 94 96 98 97 95 100
101 99 93 91 88 84 104 103 106 109 110 108 112 111 107 116 115 117 118
119 114 113 122 121 120 124 126 127 125 128 123 105 102
```

```
Inorder traversal for BST resulting from 'test1.csv':
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72
73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113
114 115 116 117 118 119 120 121 122 123 124 125 126 127 128
```