Assignment 4 — Question 2: LinkedBinarySearchTree Test Exhibits

Exercise getHeight() method:

```
The height of this tree is: 15
```

```
The height of this tree is now: -1
```

Exercise the size() method:

```
The size of this tree is: 16
```

```
The size of this tree is now: 0
```

Exercise the getRootElement() method:

```
The root element of this tree is: Azrael
```

Exercise getLeft() method:

```
The left subtree of this tree:
Azrael
Balthazar
Caspar
Cassiel
Dismas
Israfil
Jeremiel
Joachim
```

```
The left subtree of this tree:
```

Exercise getRight() method:

```
The right subtree of this tree:
Lucifer
Melchior
Phanuel
Raziel
Samael
Zephaniel
Zerachiel
```

getLeft() and getRight() when the tree is empty:

```
Exception thrown and caught; The get left operation failed. The tree is empty.
Exception thrown and caught; The get right operation failed. The tree is empty.
```

Exercise contains() method:

```
Contains the name "Joachim": true
Contains the name "Donovan": false
```

Exercise findMax() and findMin() methods:

```
The "maximum" name as ordered by the Unicode character set: Zerachiel
The "minimum" name as ordered by the Unicode character set: Azrael
```

```
Exception thrown and caught; The findMax() operation failed. The tree is empty.
Exception thrown and caught; The findMin() operation failed. The tree is empty.
```

Exercise remove() method:

```
Removing element: Israfil.
Tree contains the name "Israfil": false
```

Exercise removeMax() method:

```
Removing all nodes from the tree using remove max operation...

The size of this tree is now: 9
The size of this tree is now: 8
The size of this tree is now: 7
The size of this tree is now: 6
The size of this tree is now: 5
The size of this tree is now: 4
The size of this tree is now: 3
The size of this tree is now: 2
The size of this tree is now: 1
The size of this tree is now: 0
```

Exercise removeMin() method:

```
Removing all nodes from the tree usingremove min operation...

The size of this tree is now: 12
The size of this tree is now: 11
The size of this tree is now: 10
The size of this tree is now: 9
The size of this tree is now: 8
The size of this tree is now: 7
The size of this tree is now: 6
The size of this tree is now: 5
The size of this tree is now: 4
The size of this tree is now: 3
The size of this tree is now: 2
The size of this tree is now: 1
The size of this tree is now: 0
```

Exercising the removeAllOccurrences() method:

```
Adding the name "Karen" several times...

Current elements of the tree:
Balthazar
Caspar
Cassiel
Dismas
Jeremiel
Joachim
Karen
Karen
Karen
Karen
Lilith
Lucifer
Melchior
Phanuel
Raziel
Samael
Zephaniel
```

```
Removing all instances of the name "Karen".

The height of this tree is now: 3
The size of this tree is now: 13
Current root element of the tree: Lilith

The left subtree of this tree:
Balthazar
Caspar
Cassiel
Dismas
Jeremiel
Joachim

The right subtree of this tree:
Lucifer
Melchior
Phanuel
Raziel
Samael
Zephaniel
```

Exercising the level order traversal:

```
Populating a new tree with integer elements to test the iterator traversal methods.

A level order traversal of the tree:

5
2
8
1
4
7
9
0
3
6
```

Exercising the pre order traversal:

```
A pre order traversal of the tree:

5
2
1
0
4
3
8
7
6
9
```

Exercising a post order traversal:

```
A post order traversal of the tree:

0
1
3
4
2
6
7
9
8
5
```

Exercising an in order traversal:

```
An in order traversal of the tree:

0
1
2
3
4
5
6
7
8
9
```

Exercising the isEmpty() method:

```
The size of this tree is now: 10
This tree is empty: false
```

```
The height of this tree is now: -1
This tree is empty: true
```