This quiz has 4 questions, for a total of 10 points.

1. **3 points** What code needs to be filled into the blanks labeled (a), (b), and (c) to finish this algorithm that searches within a Binary Search Tree rooted at node $n$ for a node whose key is equal to the key $k$?

   ```python
def tree_search(n, k, less):
    if ___(a)___:
        if n.left:
            return ___(b)___
        else:
            return n
    elif less(n.key, k):
        if n.right:
            return ___(c)___
        else:
            return n
    else:
        return n
```

**Solution:** 1 point for each correct answer below.

(a) `less(k, n.key)`
(b) `tree_search_nonempty(n.left, k, less)`
(c) `tree_search_nonempty(n.right, k, less)`

2. **3 points** Draw the result of deleting the node with key 4 from the following Binary Search Tree.

   ![Binary Search Tree Diagram]

   **Solution:** 2 points for moving the successor or predecessor to the deleted node’s position. 1 point for a resulting tree that is a BST and includes all the nodes except the deleted one.

   ![Resulting Binary Search Tree Diagrams]
3. **2 points** What is the output, if any, of the following Python program?

```python
def f(x, y):
    return x.z + y.z
class A:
    def __init__(self, i):
        self.z = i
    def m(self, b):
        return f(b, self)
a = A(21)
print(a.m(a))
```

**Solution:** 2 points for the correct output, which is 42

4. **2 points** Write down the sequence of keys from the following Binary Search Tree, ordering according to the in-order traversal strategy.

```
   15
  /   \
3     45
 /     /
7      22
```

**Solution:** 2 points for the correct sequence, which is:

3, 7, 15, 22, 45

(1 point if the sequence is close, such as missing one number.)