**Week 4 Task 1**

**Insertion sort**

Unsorted Array = [2,7,9,4,1,5,3,6,0,8]

**Step 1**: there is nothing to the left of 2 so we mark It as sorted initially |   
[2,7,9,4,1,5,3,6,0,8]

**Step 2**: 7 is compared to 2 to see which is larger | [2,7,9,4,1,5,3,6,0,8] | 2 is smaller and so remains where it is   
[2,7,9,4,1,5,3,6,0,8]

**Step 3**: 9 is compared to 7 | [2,7,9,4,1,5,3,6,0,8] | 7 is smaller so remains |   
[2,7,9,4,1,5,3,6,0,8]

**Step 4**: 4 is compared to 9 | [2,7,9,4,1,5,3,6,0,8] | 4 is smaller and so moves to the left of 9 until it finds a number smaller than it |   
[2,4,7,9,1,5,3,6,0,8]

**Step 5**: 1 is compared to 9 | [2,4,7,9,1,5,3,6,0,8] | 1 is smaller and so moves to the left | [1,2,4,7,9,5,3,6,0,8]

**Step 6**: 5 is compared to 9 | [1,2,4,7,9,5,3,6,0,8] | 5 is smaller and so moves to the left | [1,2,4,5,7,9,3,6,0,8]

**Step 7**: 3 is compared to 9 | [1,2,4,5,7,9,3,6,0,8] | 3 is smaller and so moves to the left | [1,2,3,4,5,7,9,6,0,8]

**Step 8**: 6 is compared to 9 | [1,2,3,4,5,7,9,6,0,8] | 6 is smaller and so moves to the left |

[1,2,3,4,5,6,7,9,0,8]

**Step 9**: 0 is compared to 9 | [1,2,3,4,5,6,7,9,0,8] | 0 is smaller and so moved to the left |

[0,1,2,3,4,5,6,7,9,8]

**Step 10**: 8 is compared to 9 | [0,1,2,3,4,5,6,7,9,8] | 8 is smaller and so moves to the left |

[0,1,2,3,4,5,6,7,8,9]

All elements of the list are now sorted and so the list can be said to be sorted.

**Bubble Sort**

Unsorted Array = [2,7,9,4,1,5,3,6,0,8]

**Step 1:** Each element in the array is compared to the one before it to see if it needs to be swapped (it will be swapped if it is smaller than the preceding element):

1.1: [2,7,9,4,1,5,3,6,0,8]

1.2: [2,7,9,4,1,5,3,6,0,8]

1.3: [2,7,9,4,1,5,3,6,0,8] | 4 is smaller than 9 so they get swapped | [2,7,4,9,1,5,3,6,0,8]

1.4: [2,7,4,9,1,5,3,6,0,8] | 1 is smaller than 9 so they get swapped | [2,7,4,1,9,5,3,6,0,8]

1.5:[2,7,4,1,9,5,3,6,0,8] | 5 is smaller than 9 so they get swapped | [2,7,4,1,5,9,3,6,0,8]

1.6: [2,7,4,1,5,9,3,6,0,8] | 3 is smaller than 9 so they get swapped | [2,7,4,1,5,3,9,6,0,8]

1.7: [2,7,4,1,5,3,9,6,0,8] | 6 is smaller than 9 so they get swapped | [2,7,4,1,5,3,6,9,0,8]

1.8: [2,7,4,1,5,3,6,9,0,8] | 0 is smaller than 9 so they get swapped | [2,7,4,1,5,3,6,0,9,8]

1.9: [2,7,4,1,5,3,6,0,9,8] | 8 is smaller than 9 so they get swapped | [2,7,4,1,5,3,6,0,8,9]

9 Is now sorted and the sort will now iterate over the list until the entire list is sorted

**Step 2**: [2,7,4,1,5,3,6,0,8,9] -> [2,4,1,5,3,6,0,7,8,9]

**Step 3:** [2,4,1,5,3,6,0,7,8,9] -> [2,1,4,3,5,0,6,7,8,9]

**Step 4**: [2,1,4,3,5,0,6,7,8,9] -> [1,2,3,4,0,5,6,7,8,9]

**Step 5**: [1,2,3,4,0,5,6,7,8,9] -> [1,2,3,0,4,5,6,7,8,9]

**Step 6**: [1,2,3,0,4,5,6,7,8,9] -> [1,2,0,3,4,5,6,7,8,9]

**Step 7**: [1,2,0,3,4,5,6,7,8,9] -> [1,0,2,3,4,5,6,7,8,9]

**Step 8**: [1,0,2,3,4,5,6,7,8,9] -> [0,1,2,3,4,5,6,7,8,9]

**Selection Sort**

Unsorted Array = [2,7,9,4,1,5,3,6,0,8]