Anthony Gale - 227008736

Q1:

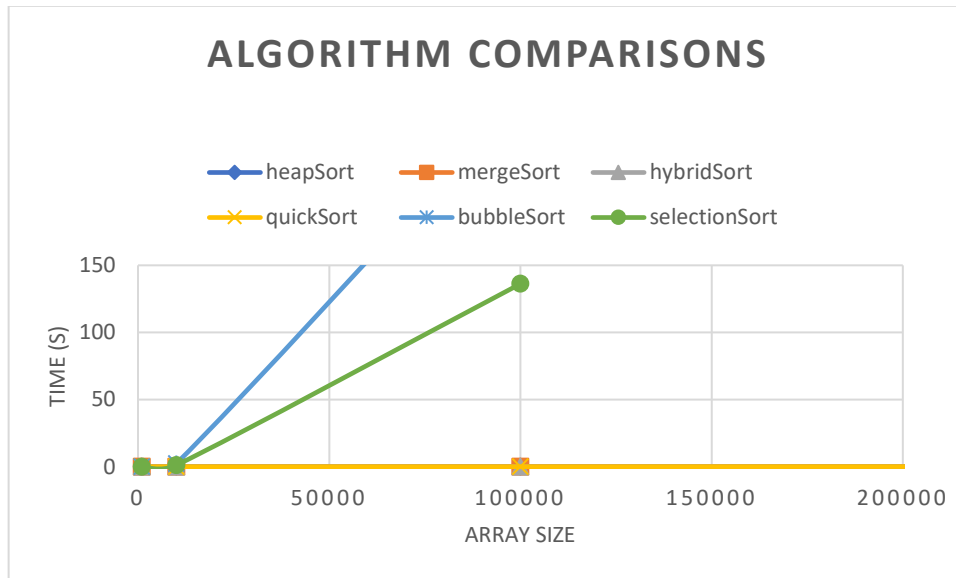a) O(n), iterates through the list once

b) O(n^2), inner and outer loop iterate n times each

c) O(n^2)

e)

Bubble sort is the longest and selection sort was second longest in my test
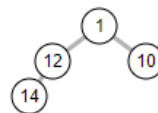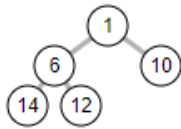

Q2:

b1)

Step 1:   Step 2:

Step 3:   Step 4:

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Step 5:

```
        1
       / \
      6   10
     / \
   14   12
```

Step 6:

```
        1
       / \
      6   5
     / \   \
   14  12   10
```

Step 7:

```
        1
       / \
      6   5
     / \ / \
   14 12 10 8
```

Step 8:

```
          1
         / \
        6   5
       / \ / \
     14 12 10 8
     /
   15
```

Step 9:

```
          1
         / \
        3   5
       / \ / \
      6  12 10 8
     / \
   15  14
```

Step 10:

```
            1
           / \
          3   5
         / \ / \
        6  9 10  8
       /|  \
     15 14  12
```

Step 11:

```
            1
           / \
          3   5
         / \ / \
        6   7 10  8
       /|  /|
     15 14 12 9
```

Step 12:

```
            1
           / \
          3   4
         / \ / \
        6   7 5   8
       /|  /| |
     15 14 12 9 10
```

Step 13:

```
            1
           / \
          3   4
         / \ / \
        6   7 5   8
       /|  /| |\
     15 14 12 9 10 11
```

Step 14:

```
              1
             / \
            3   4
           / \ / \
          6  7  5   8
         /|  /| |\  \
       15 14 12 9 10 11 13
```

Step 15:

```
              1
             / \
            3   2
           / \ / \
          6  7 5   4
         /|  /| |\  |\
       15 14 12 9 10 11 13 8
```
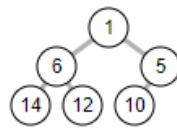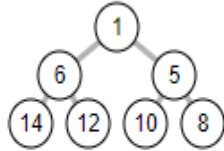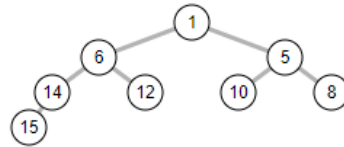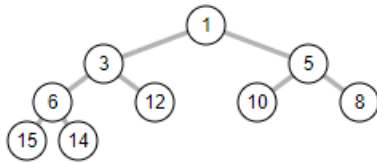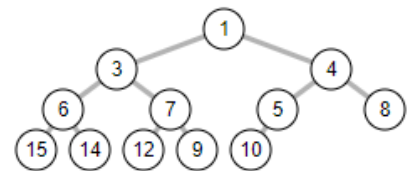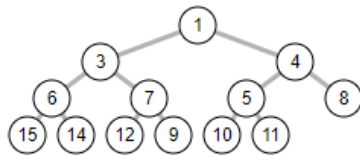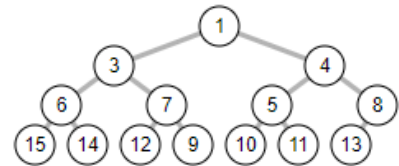
b2)

Step 1:

Step 2:
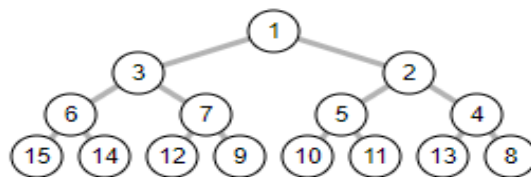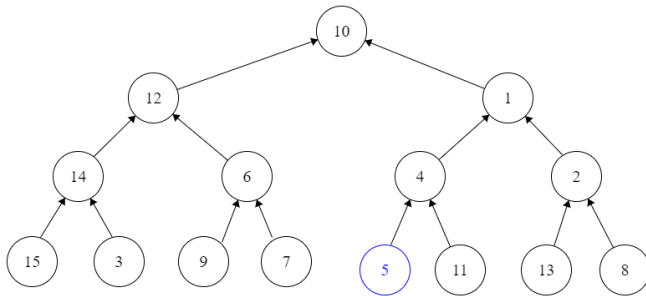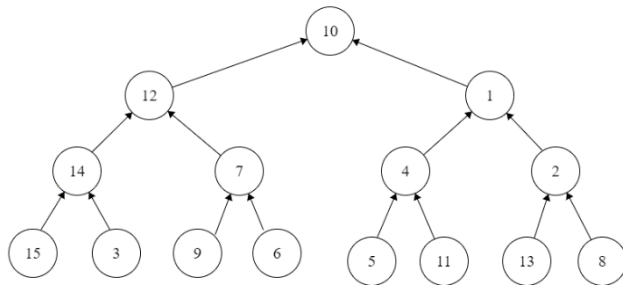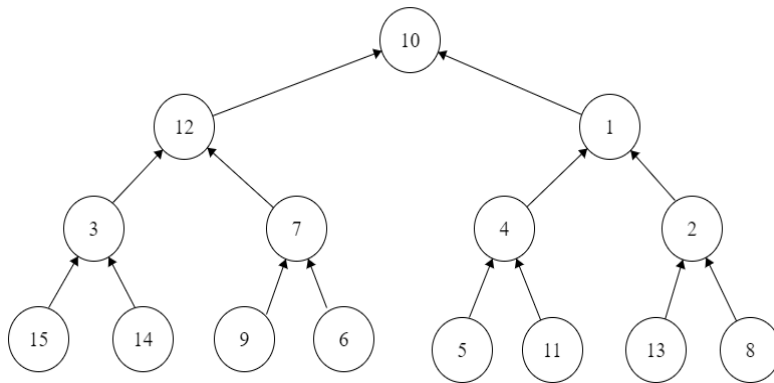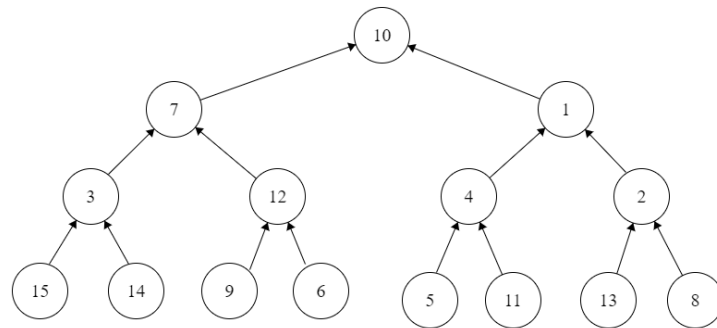

Step 3:

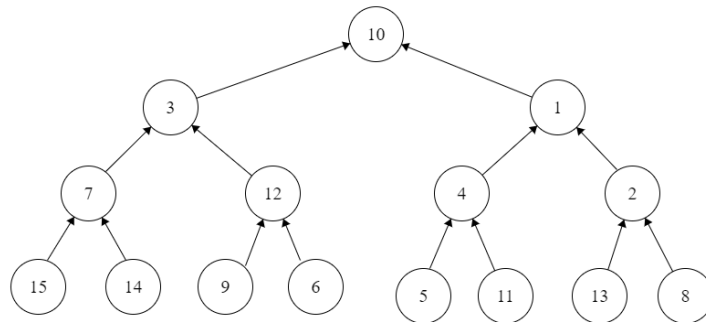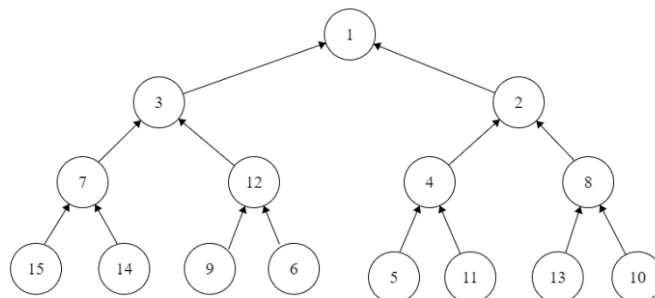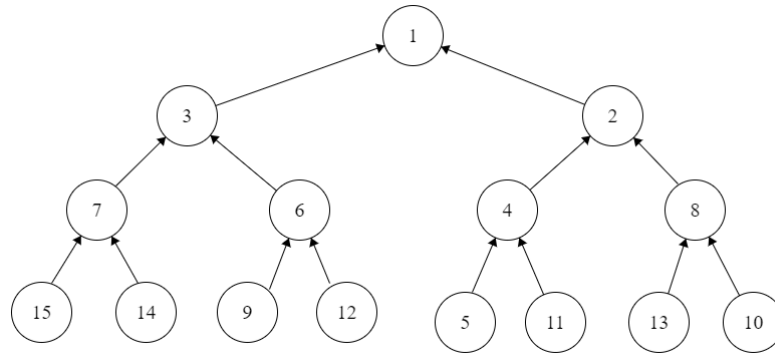Step 4:

Step 5:

Step 6:

Step 7:

Step 8:

c) The time complexity of my algorithm is n+klog(n), the first n is to make the Min heap using buildHeap, and the klog(n) is for using the extractMin method (which is log(n) complexity) k times.