Sorting (Part 1)

EX1 :

Code :

Merge sort

```python
class merge:
    def __init__(self,):
        self.mergeList = []

    def calculate(self,listVal):

        def cal(mid):
            listLeft = listVal[:mid]
            listRight = listVal[mid:]

            listRight.sort()
            listLeft.sort()

            i = 0
            j = 0

            while True:
                if len(listLeft) < i and len(listRight) < j:
                    break
                elif len(listLeft) == i and len(listRight) > j:
                    self.mergeList.append(listRight[j])
                    j += 1
                    break
                elif len(listLeft) > i and len(listRight) == j:
                    self.mergeList.append(listLeft[i])
                    i += 1
                    break

                if listLeft[i] > listRight[j]:
                    self.mergeList.append(listRight[j])
                    j += 1
                else:
                    self.mergeList.append(listLeft[i])
                    i += 1
            print(self.mergeList)

        rangeList = len(listVal)

        if rangeList % 2 == 1:
            mid = int(rangeList / 2) + 1
            cal(mid)
        else:
            mid = int(rangeList / 2)
            cal(mid)

listVal = [29,10,14,37,14,20,7,16,12]
m = merge()
m.calculate(listVal)
```

Result :

```
[7, 10, 12, 14, 14, 16, 20, 29]
```

EX2 :

Code :

Quick sort lomuto

```python
class lomuto:
    def __init__(self,listVal):
        self.lomutoList = listVal
        self.pivot = len(listVal)-1

    def calculate(self):
        l = len(self.lomutoList)
        if self.pivot < 0:
            return 0

        if self.lomutoList[0] >= self.lomutoList[self.pivot]:
            self.lomutoList[0],self.lomutoList[self.pivot] = self.lomutoList[self.pivot],self.lomutoList[0]

        print(self.lomutoList[self.pivot])
        print(self.lomutoList)

        for i in range(self.pivot):
            if self.lomutoList[self.pivot] <= self.lomutoList[i]:
                self.lomutoList[i], self.lomutoList[i+1] = self.lomutoList[i+1], self.lomutoList[i]
        self.pivot -= 1
        print(self.lomutoList)
        lomuto.calculate(self)

listVal = [29,10,14,37,14,20,7,16,12]
l = lomuto(listVal)
l.calculate()
```

Result :

```
[12, 10, 14, 37, 14, 20, 7, 16, 29]
[12, 10, 14, 14, 20, 7, 16, 29, 37]
[12, 10, 14, 14, 20, 7, 16, 29, 37]
[12, 10, 14, 14, 20, 7, 16, 29, 37]
[12, 10, 14, 14, 20, 7, 16, 29, 37]
[12, 10, 14, 14, 7, 16, 20, 29, 37]
[12, 10, 14, 14, 7, 16, 20, 29, 37]
[12, 10, 14, 14, 7, 16, 20, 29, 37]
[7, 10, 14, 14, 12, 16, 20, 29, 37]
[7, 10, 14, 12, 14, 16, 20, 29, 37]
[7, 10, 14, 12, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
[7, 10, 12, 14, 14, 16, 20, 29, 37]
```

EX3 :

Code:

Quick sort hoare

```python
class hoare:
    def __init__(self,listVal):
        self.hoareList = listVal
        self.pivot = 0

    def calculate(self):

        i = 0
        j = len(self.hoareList) - 1

        while i != j:
            while self.hoareList[i] <= self.hoareList[self.pivot]:
                i += 1
            while self.hoareList[j] >= self.hoareList[self.pivot]:
                if j == self.pivot:
                    break
                j -= 1

            print(self.hoareList)
            self.hoareList[i],self.hoareList[j] = self.hoareList[j],self.hoareList[i]
            print(self.hoareList)

            if i > j:
                self.hoareList[i], self.hoareList[j] = self.hoareList[j], self.hoareList[i]
                print(self.hoareList)
                self.hoareList[self.pivot], self.hoareList[j] = self.hoareList[j], self.hoareList[self.pivot]
                i = 0
                j = len(self.hoareList) - 1

            print(self.hoareList)


listVal = [29,10,14,37,14,20,7,16,12]
print(listVal)
h = hoare(listVal)
h.calculate()
```

Result:

```
Traceback (most recent call last):
  File "F:\Work\BU\CE312\Lab8\Lab8-3.py", line 34, in <module>
    h.calculate()
  File "F:\Work\BU\CE312\Lab8\Lab8-3.py", line 14, in calculate
    while self.hoareList[j] >= self.hoareList[self.pivot]:
IndexError: list index out of range
[29, 10, 14, 37, 14, 20, 7, 16, 12]
[29, 10, 14, 37, 14, 20, 7, 16, 12]
[29, 10, 14, 12, 14, 20, 7, 16, 37]
[29, 10, 14, 12, 14, 20, 7, 16, 37]
[29, 10, 14, 12, 14, 20, 7, 16, 37]
[29, 10, 14, 12, 14, 20, 7, 37, 16]
[29, 10, 14, 12, 14, 20, 7, 16, 37]
[16, 10, 14, 12, 14, 20, 7, 29, 37]
[16, 10, 14, 12, 14, 20, 7, 29, 37]
[16, 10, 14, 12, 14, 7, 20, 29, 37]
[16, 10, 14, 12, 14, 7, 20, 29, 37]
[16, 10, 14, 12, 14, 7, 20, 29, 37]
[16, 10, 14, 12, 14, 20, 7, 29, 37]
[16, 10, 14, 12, 14, 7, 20, 29, 37]
[7, 10, 14, 12, 14, 16, 20, 29, 37]
```

Explanation

Merge sort Draw the sorting