Bubble Sort

```
4  77 | 98  30  20  50  77  22  49  2
4  [77  98]  30  20  50  77  22  49  2
4  77  [98  30]  20  50  77  22  49  2
4  77  30  [98  20]  50  77  22  49  2
4  77  30  20  [98  50]  77  22  49  2
4  77  30  20  50  [98  77]  22  49  2
4  77  30  20  50  77  [98  22]  49  2
4  77  30  20  50  77  22  [98  49]  2
4  77  30  20  50  77  22  49  [98  2]
[4  77]  30  20  50  77  22  49  2  98  ...cont
4  30  20  50  77  22  49  2  [77]  98     last rep for this round
4  20  30  50  22  49  2  77  77  98
4  20  30  22  49  2  50  77  77  98
4  20  22  30  2  49  50  77  77  98
4  20  22  2  30  49  50  77  77  98
4  20  2  22  30  49  50  77  77  98
4  2  20  22  30  49  50  77  77  98
2  4  20  22  30  44  50  77  77  98
```

Selection Sort
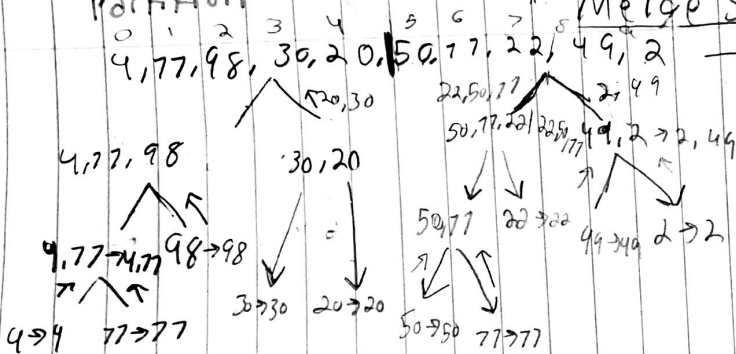
i=0
arr() = {4, 77, 98, 30, 20, 50, 77, 22, 49, 2} swap arr[0] and arr[9]

i=1   2, 77, 98, 30, 20, 50, 77, 22, 49, 4 swap arr[1] and arr[9]

i=2   2, 4, 98, 30, 20, 50, 77, 22, 49, 77 swap arr[2] and arr[4]

i=3   2, 4, 20, 30, 98, 50, 77, 22, 49, 77 swap arr[3] and arr[7]

i=4   2, 4, 20, 22, 98, 50, 77, 30, 49, 77 swap arr[4] and arr[7]

i=5   2, 4, 20, 22, 30, 50, 77, 98, 49, 77 swap arr[5] and arr[8]

i=6   2, 4, 20, 22, 30, 49, 77, 98, 50, 77 swap arr[6] and arr[8]

i=7   2, 4, 20, 22, 30, 49, 50, 98, 77, 77 swap arr[7] and arr[8]

i=8   2, 4, 20, 22, 30, 49, 50, 77, 98, 77 swap arr[8] and arr[9]

final Array: 2, 4, 20, 22, 30, 49, 50, 77, 77, 98

Insertion Sort

arr = {4, 77, 98, 30, 20, 50, 77, 22, 49, 2}

i=4, j=4 temp=arr[2] <

4, 30, 77, 98, 20, 50, 77, 22, 49, 2

4, 20, 30, 77, 98, 50, 77, 22, 49, 2

4, 20, 30, 50, 77, 98, 77, 22, 49, 2

4, 20, 30, 50, 77, 77, 98, 22, 49, 2

4, 20, 22, 30, 50, 77, 77, 98, 49, 2

4, 20, 22, 30, 49, 50, 77, 77, 98, 2

2, 4, 20, 22, 23, 30, 49, 50, 77, 77, 98

Partition   Merge Sort

0 1   2   3   4   5 6 7   8
4, 77, 98, 30, 20, 50, 77, 22, 49, 2 ——→ 2, 4, 20, 22, 23, 30, 49, 50, 17, 77, 98

                    20,30   22,50,17   2, 49

4, 77, 98   30, 20   50,77,22|22,50,77   49, 2 → 2, 49   4 20 30 77 98 | 2 22 49 50 77

   98→98   24 20 22 30 4950 77 77 a8
4,77→4,77   30,20   50,77   22→22   49→49   2→2

4→4   77→77   30→30 20→20   50→50 77→77

QuickSort

4 77 98 30 20 50 77 22 49 2

lets say random pivot = 50

4 77 98 30 20 (50) 77 22 49 2
4 2 98 30 20 (50) 77 22 4 9 77
4 2 49 30 20 (50) 77 22 98 77
4 2 49 30 20 (50) 22 77 98 77
4 2 49 30 20 22 (50) 77 (98) 77   pivot = 98

Choose
random pivot = 30

4 2 22 (30) 20 49   77 98 77
4 2 22 20 (30) 49   77 77 (98)

                                   ↓   ↓   ↓
                                   77   77   98

         ↓   →49

random
pivot = 4   2 [4] 22 20
         [2]↙   ↓
                   20 22

2 4 20 22 30 49 . 77 77 98