EXERCISES

EXERCISE 1: SIMPLE OR QUADRATIC SORTING ALGORITHMS

Program 5.11 is Bubble Sort algorithm:

```
1   // Program 5.11
2   // Bubble Sort
3   void BubbleSort(dataType data[], int listSize)
4   {   int pass, tempValue;
5       for (pass = 1; pass < listSize; pass++)
6       {
7        // moves the largest element to the
8        // end of the array
9            for (int x = 0; x < listSize - pass; x++)
10              //compare adjacent elements
11              if (data[x] > data[x+1])
12              {//swap elements
13                   tempValue = data[x];
14                   data[x] = data[x+1];
15                   data[x+1] = tempValue;
16              }// end if
17           } // end for
18  } // end Bubble Sort
```

a. Using the following set of data, show step by step of implementing Bubble Sort in Program 5.11 on the data. Compare the efficiency of the algorithm.

[0]	[1]	[2]	[3]	[4]	[5]	[6]
3	5	7	6	9	8	12

Array A

and

[0]	[1]	[2]	[3]	[4]	[5]	[6]
8	9	6	7	5	3	12

Array B

b. Based on your answer given in (a), give reason why Bubble Sort algorithm in Program 5.11 is not efficient. Explain how the program can be improved.

c. Rewrite Program 5.11 in order to improve the efficiency.

d. Given the following data set:

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]
1	3	5	9	11	13	15	19

Array C

Show step by step the process of sorting the data using the following sorting techniques:

- Selection Sort.
- Insertion Sort.

Discuss, which of the algorithms are signifcantly faster when run on the array.

EXERCISE 2: SIMPLE OR QUADRATIC SORTING ALGORITHMS

a. What is the **difference** between Bubble Sort and Selection Sort operation?

b. Trace the Bubble Sort and Selection Sort as it sorts the following array into **descending order.**

[0]	[1]	[2]	[3]	[4]	[5]
20	80	40	25	60	30

Array D

c. Given the following list of keys,

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
28	18	21	10	25	30	12	71	32	58	15

Array E

This list is to be sorted using the Insertion Sort algorithm. Show the resulting list for the first 5 passes of the sorting phase.

EXERCISE 3: SIMPLE OR QUADRATIC SORTING ALGORITHMS

Given function Sort in program 5.12 and answer question a – f.

```
1   // Program 5.12
2   // function Sort
3   void Sort(int Data[], int n)
4   { int temp, x, last;
5     for (last = n - 1; last >= 1; last--)
6     {  x = 0;
7       for (int p = 1; p <= last; ++p)
8       {   if (Data[p] < Data[X])
9               X = p;
10     } // end for
11     temp = data[last];
12     data[last] = data[X];
13     data[X] = temp;
14    } // end for
15  }  // end Function Sort
```

a. Based on the function `Sort()` given above, show step by step the implementation of the sorting algorithm in sorting Array F with 6 values.

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

Array F