

Functions.h file:

```
#ifndef _FUNCTIONS_H_
#define _FUNCTIONS_H_
#include <fstream>
#include <iostream>
using namespace std;

int readData(int *&arr)
{
    ifstream indata;
    int num{0};

    indata.open("data.txt");
    indata >> num;
    arr = new int[num];
    int size = num;
    int index{0};

    while (!indata.eof())
    {
        indata >> num;
        *(arr + index) = num;
        index++;
    }
    indata.close();
    return size;
}

void bSort(int *arr, int last)
{
    bool swapped = true;
    int j = 0;
    int tmp;

    while (swapped)
    {
        swapped = false;
        j++;
        for (int i = 0; i < last - j; i++)
        {
```

```

        if (*(arr + i) > *(arr + i + 1))
        {
            tmp = *(arr + i);
            *(arr + i) = *(arr + i + 1);
            *(arr + i + 1) = tmp;
            swapped = true;
        }
    }
}

```

```

void writeToConsole(const int *arr, int last)
{
    for (int i{0}; i < last; i++)
    {
        cout << *(arr + i) << " ";
    }
}

```

```

void descendingBSort(int *arr, int last)
{
    bool swapped = true;
    int j = 0;
    int tmp;

    while (swapped)
    {
        swapped = false;
        j++;
        for (int i = 0; i < last - j; i++)
        {
            if (*(arr + i) < *(arr + i + 1))
            {
                tmp = *(arr + i);
                *(arr + i) = *(arr + i + 1);
                *(arr + i + 1) = tmp;
                swapped = true;
            }
        }
    }
}

```

```

}

void bubble_sort(int *arr, int size, void (*sortFunct)(int *arr, int))
{
    sortFunct(arr, size);
}

#endif // _FUNCTIONS_H_

```

Main file:

```

#include "functions.h"
// Raymond Guevara
// Brent Nishioka

int main(){
    int *arr {nullptr};
    int size {readData(arr)};

    cout << "Elements: ";
    for (int i {0}; i < size; i++){
        cout << *(arr + i) << " ";
    }
    cout << endl << endl;

    cout << "Ascending Sort: ";
    bubble_sort(arr, size, bSort);
    writeToConsole(arr, size);
    cout << endl;

    cout << "Descending Sort: ";
    bubble_sort(arr, size, descendingBSort);
    writeToConsole(arr, size);
    cout << endl;
    delete arr;
    return 0;
}

```

Runtime output:

```
raymond@raymond-P95-HR:~/Folders/Programs/Cpp Programs/282/Lab3$ ./main
```

```
Elements: 8 4 7 2 9 5 6 1 3
```

```
Ascending Sort: 1 2 3 4 5 6 7 8 9
```

```
Descending Sort: 9 8 7 6 5 4 3 2 1
```