

Swinburne University (Vietnam)
Department of Information Technology

ASSIGNMENT COVER SHEET

Subject Code: COS30008
Subject Title: Data Structures and Patterns
Assignment number and title: 2, Indexers, Method Overriding, and Lambdas
Due date: October 18, 2022, 23:50
Lecturer: Dr. Phuong Anh Nguyen

Your name: Trac Duc Anh Luong **Your student id:** 103488117

Check Tutorial	Mon 10:30	Mon 14:30	Tues 08:30	Tues 10:30	Tues 12:30	Tues 14:30	Tues 16:30	Wed 08:30	Wed 10:30	Wed 12:30	Wed 14:30
				X							

Marker's comments:

Problem	Marks	Obtained
1	48	
2	30+10= 40	
3	58	
Total	146	

Extension certification:

This assignment has been given an extension and is now due on _____

Signature of Convener: _____

Problem 1

```
#include "IntVector.h"
```

```
#include "stdexcept"
```

```
IntVector::IntVector(const int aArrayOfIntegers[], size_t aNumberOfElements) :
```

```
fNumberOfElements(aNumberOfElements)
```

```
{
    fElements = new int[fNumberOfElements];
    for (size_t i = 0; i < fNumberOfElements; i++)
    {
        fElements[i] = aArrayOfIntegers[i];
    }
}
```

```
IntVector::~~IntVector()
```

```
{
    delete[] fElements;
}
```

```
size_t IntVector::size() const
```

```
{
    return fNumberOfElements;
}
```

```
const int IntVector::get(size_t aIndex) const
```

```
{
    return (*this)[aIndex];
}
```

```
void IntVector::swap(size_t aSourceIndex, size_t aTargetIndex)
```

```
{
    if (aSourceIndex >= fNumberOfElements || aTargetIndex >= fNumberOfElements) throw
std::out_of_range("Illegal vector indices");
    int temp = fElements[aSourceIndex];
    fElements[aSourceIndex] = fElements[aTargetIndex];
    fElements[aTargetIndex] = temp;
}
```

```
const int IntVector::operator[](size_t aIndex) const
```

```
{
    if (aIndex >= fNumberOfElements) throw std::out_of_range("Illegal vector index");
    return fElements[aIndex];
}
```

Output

```
Microsoft Visual Studio Debug Console
Test range check:
Properly caught error: Illegal vector index
Test swap:
lVector[3] = 86
lVector[6] = 20
lVector.get( 3 ) = 20
lVector.get( 6 ) = 86
Properly caught error: Illegal vector indices

C:\Users\Pro\Documents\Swinburne\COS30008\Assignments & labs\Assignment 2\Assignment2\x64\Debug\Assignment2.exe (process
16596) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

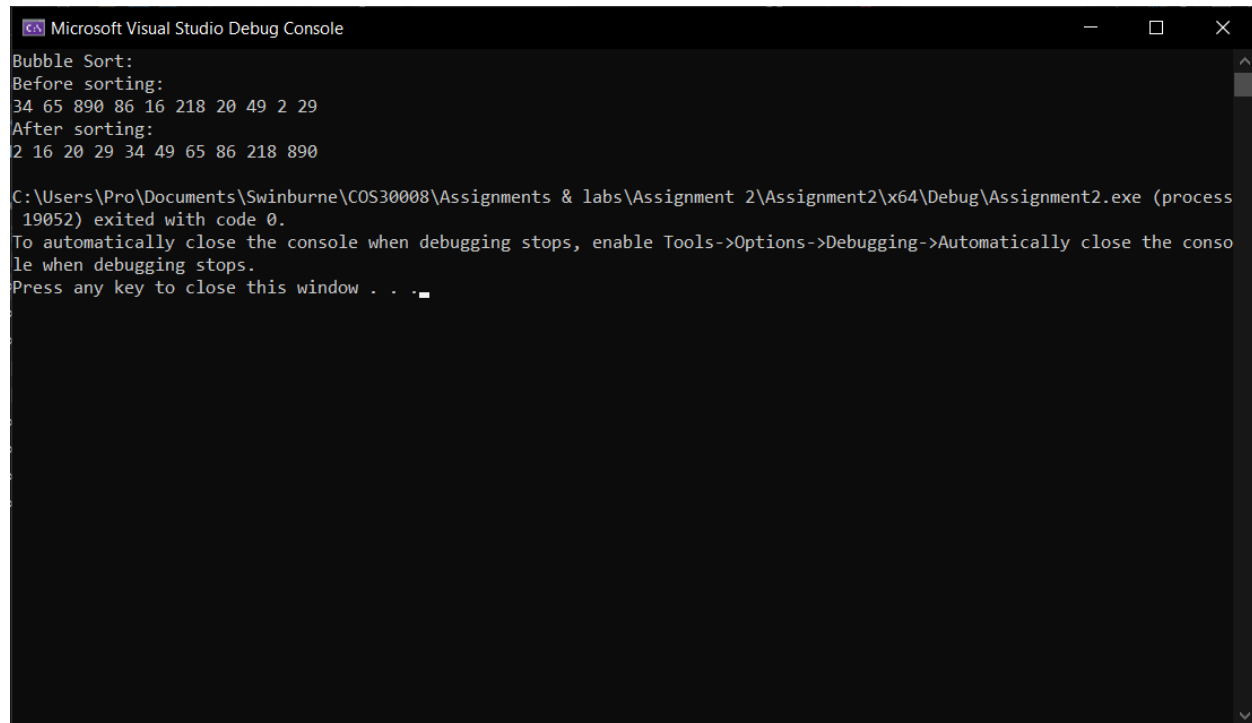
Problem 2

```
#include "SortableIntVector.h"
```

```
SortableIntVector::SortableIntVector(const int aArrayOfIntegers[], size_t aNumberOfElements) :  
IntVector(aArrayOfIntegers, aNumberOfElements)  
{}
```

```
void SortableIntVector::sort(Comparable aOrderFunction)  
{  
    for (size_t i = 0; i < (*this).size(); i++)  
    {  
        for (size_t j = (*this).size() - 1; j > i; j--)  
        {  
            if (aOrderFunction(get(j), get(j - 1)))  
            {  
                (*this).swap(j, j - 1);  
            }  
        }  
    }  
}
```

Output



```
Microsoft Visual Studio Debug Console  
Bubble Sort:  
Before sorting:  
34 65 890 86 16 218 20 49 2 29  
After sorting:  
2 16 20 29 34 49 65 86 218 890  
  
C:\Users\Pro\Documents\Swinburne\COS30008\Assignments & labs\Assignment 2\Assignment2\x64\Debug\Assignment2.exe (process  
19052) exited with code 0.  
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso  
le when debugging stops.  
Press any key to close this window . . .
```

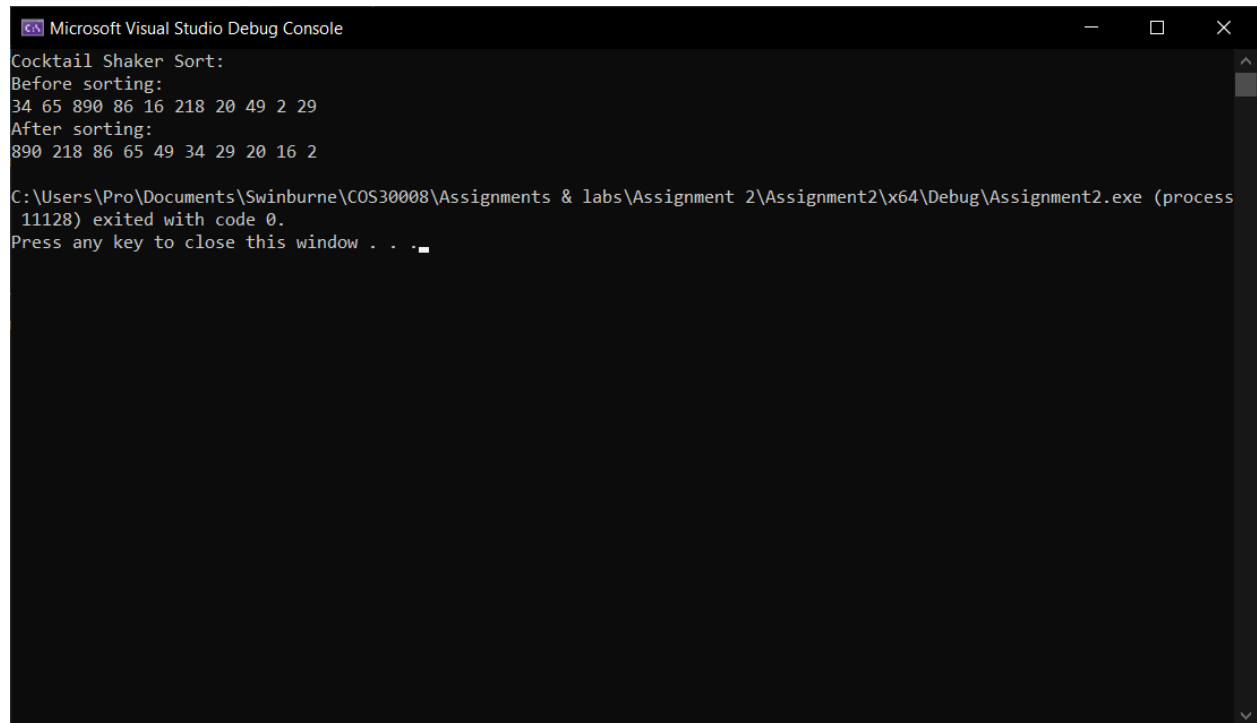
Problem 3

```
#include "ShakerSortableIntVector.h"
```

```
ShakerSortableIntVector::ShakerSortableIntVector(const int aArrayOfIntegers[], size_t  
aNumberOfElements) : SortableIntVector(aArrayOfIntegers, aNumberOfElements)  
{
```

```
void ShakerSortableIntVector::sort(Comparable aOrderFunction)  
{  
    for (size_t i = 0; i < (*this).size(); i++)  
    {  
        for (size_t j = (*this).size() - 1; j > i; j--)  
        {  
            if (aOrderFunction(get(j - 1), get(j)))  
            {  
                (*this).swap(j, j - 1);  
            }  
        }  
    }  
}
```

Output



```
Microsoft Visual Studio Debug Console  
Cocktail Shaker Sort:  
Before sorting:  
34 65 890 86 16 218 20 49 2 29  
After sorting:  
890 218 86 65 49 34 29 20 16 2  
  
C:\Users\Pro\Documents\Swinburne\COS30008\Assignments & labs\Assignment 2\Assignment2\x64\Debug\Assignment2.exe (process  
11128) exited with code 0.  
Press any key to close this window . . .
```