# COE528 (Fall 2016)
# Lab4

**General Lab Rules**
All the necessary files of this lab should be in lab4 directory.
All the java files in this lab should have the following package declaration:

```
package coe528.lab4;
```

**Duration: one week.**

## Objectives

- Implement Data Abstractions.
- Provide and implement rep invariant and abstraction function.

## Exercise 1: (Exercise 5.2, page 121)

In the Netbeans program, click on Project > New Project and save it as "Ex1" on your lab4 directory.

Create a new class called `IntSets`. Suppose `IntSets` were implemented using a `Vector` (as given in page 88), but the `els` component was kept sorted in increasing size. Give the rep invariant and abstraction function for this implementation. Also implement `repOK()` and `toString()` methods.

## Exercise 2:

In the Netbeans program, click on Project > New Project and save it as "Ex2" on your lab4 directory.

Create a new class called “CharStack” and copy the code in it.

```
public class CharStack {

  /** Implementation of a first-in, last-out stack. **/


  // Abstraction function:


  // Rep invariant:
```

```
  // Instance variables
  private char[] stackArray;// The array implementing the stack.
  private int topOfStack; // The top of the stack.

  // Static variable
  private static int counter;

  //Constructor now increments the counter for each object created.
  public CharStack(int capacity) {
    stackArray = new char[capacity];
    topOfStack = -1;
    counter++;
  }

  // Instance methods
  public void push(char element) {
    stackArray[++topOfStack] = element;
  }

  public char pop() {
    return stackArray[topOfStack--];
  }

  public char peek() {
    return stackArray[topOfStack];
  }

  public boolean isEmpty() {
    return topOfStack < 0;
  }

  public boolean isFull() {
      return topOfStack == stackArray.length - 1;
  }
```

```
  public boolean repOK() {

    // EFFECTS: Returns true if the rep invariant holds for this;

    //otherwise returns false

  }
}
```

a) Write the rep invariant and the abstraction function in the *Overview* clause.

b) Fill in the body of the method `repOK`().

## Submitting your lab

You must submit your lab electronically at least 24 hours prior to the start of your scheduled lab period for Lab 5.

You must include the duly filled and signed standard cover page with your submission. The cover page can be found on the departmental web site: Standard Assignment/Lab Cover Page

If you did the lab on a Departmental computer, you can do the following:

```
cd coe528
zip -r lab4.zip lab4
submit coe528 lab4 lab4.zip
```

If you did the lab on your own computer, zip the lab4 folder (remember to do this recursively so that all sub-folders are included), then transfer the zip file to a Departmental machine, logon to a Departmental machine which can be done remotely) and type in the submit command:

```
submit coe528 lab4 lab4.zip
```