# Lab Assignment 19 (Generics)

**Every program must always have the following information in the comments at the top.  
 Program Name  
 Your Name  
 A description of what the program does  
(Failure to include this will result in lost points.)**

Write the following Java programs; then build and run them. When they build and run correctly, copy the code into a separate text file for each program, with the same name as that program. Submit the text files. (\*If a program has more than one class, include all classes in that program’s text file.)

1. Write a program named **Lab19A** that will create and process an ArrayList of Strings.

* In your main method create an ArrayList of Strings and fill it with the data from the text file, Lab19A.txt. (Each string will be a single word.)
* Write a void method that receives the ArrayList as a parameter. It should ask the user for an integer and print all items in the ArrayList with a length less than the input number. (All the words should be written on one line with a space between them.)

1. Write a program named **Lab19B** that makes an ArrayList of objects. The program will have 2 classes, the main class and a second class named **Box**.

* The **Box** class should have the following:
  + - An instance variable for the type of item in the box (String) and an instance variable for the number of items in the box (int)
  + A constructor that accepts 2 parameters to fill in the instance variables. (The parameter data types should match the instance variable types.)
  + An int method that returns the number of items (no parameters)
  + A String method that returns the item type (no parameters)
  + A String method named **toString** that returns a string with each instance variable value and a label in front of each. (If you don’t remember the basics of the toString method, look it up in the Chapter 3 PowerPoint in the Java Review Materials)
* Back in the main class, do the following:
  + Create an ArrayList of **Box** objects.
  + Read each box’s item type & number of items from the text file (Lab19B.txt)
  + Create a **Box** object with those values for each box and add it to the ArrayList
  + After the ArrayList is created, loop through it and calculate the average number of items in boxes. Print the average.
  + Loop through the ArrayList and print the information for each box (using the toString method shortcut).

1. Write a program named **Lab19C** that makes use of generic methods.
   1. Write the following generic methods:
      1. **public static <E> void printList (E [] arr)**This method should accept an array of a generic type and print the items in the array with “-“ between each element.
      2. **public static <E extends Comparable<E>> E getLargest(E [] arr)**This method should accept an array of a generic type and return the largest item in the array. Don’t forget to use the **compareTo** method in your comparisons.
      3. **public static <E extends Comparable<E>> int getLargestIndex(E [] arr)**This method should accept an array of a generic type and return the index of the largest element.
   2. In the main method, create an array of at least 5 strings and an array of at least 5 doubles and call the methods for each. (Remember the double type must actually be **Double**.)
   3. Make sure you print the results of the last two methods with labels.