



PGCert IT: Programming for Industry

Lab 09: Generics & Collections

Exercise One: Simple Generic Collections

- a. What is the output of the following code?

```
ArrayList list = new ArrayList();
Character letter = new Character('a');
list.add(letter);

if (list.get(0).equals("a")) {
    System.out.println("funny");
} else {
    System.out.println("Not funny");
}
Not funny
```

- b. What is the output of the following code?

```
ArrayList<Point> list = new ArrayList<Point>();
Point pt1 = new Point(3, 4);
list.add(pt1);
Point pt2 = list.get(0);
pt2.x = 23;
if (pt2 == pt1) {
    System.out.println("Same object");
} else {
    System.out.println("Different object");
}
Same object
```

- c. What is the error of the following code?

```
ArrayList list = new ArrayList();  
list.add('a');  
list.add(0, 34);  
String c1 = (String) list.get(1);
```

The code throws a `ClassCastException`. The list returns a `Character` object and cannot be cast to a `String` object.

Exercise Two: An Array of Strings

```
String[] array = {"ONE", "TWO", "THREE", "FOUR", "FIVE", "SIX", "SEVEN"};
```

Given the array of strings above, convert the array of strings to an `ArrayList`.

```
List<String> arrayList = new ArrayList<>();  
arrayList.addAll(Arrays.asList(array));
```

Then, write methods that make each string in the array list all lowercase. Implement the method in three different ways:

- a. Using a loop over the index values

```
for(int i = 0; i < arrayList.size(); i++) {  
    String str = arrayList.get(i).toLowerCase();  
    arrayList.set(i, str);  
}
```

- b. Using an enhanced for loop

```
int i = 0;  
for(String str : arrayList) {  
    arrayList.set(i, str.toLowerCase());  
    i++;  
}
```

- c. Using an iterator

```
ListIterator<String> it = arrayList.listIterator();  
while(it.hasNext()) {  
    String str = it.next().toLowerCase();  
    it.set(str);  
}
```

Note: `ListIterator` allows each element to be modified while going through the list. `Iterator` cannot be used as if you try to add or modify the list, you will get an exception: `java.util.ConcurrentModificationException`. With `Iterator`, you can only remove an element while going through the list.