

Lab 11
CSC 1052 - Algorithms and Data Structures II
Grading: 30 points
Due Date: April 21th, 2017

Description: In this lab, you will be practicing the use of the built in List libraries in java.util including **ArrayList**, **List**, and **Collections**. I provide you with template classes which you will modify to find the distance between Philadelphia and a list of other cities. Your goal is to compute travel plans from Philadelphia to each provided city, sort the plans by distance, then print the results.

The following imports should already be included in your java file:

```
import java.util.ArrayList;
import java.util.List;
import java.util.Collections;
```

First, implement the **City** constructor. The constructor should simply set the fields (name, longitude and latitude), of the city class with the values of the constructor argument.

Next, implement the constructor for the **TravelPlan** class. The origin, destination, and distance should be set in this constructor. To find the distance between two points, use the Euclidean distance formula. The **Euclidean distance** between two points $P = (x, y)$ and $Q = (a, b)$ in space is defined as $d(P, Q) = \sqrt{(x - a)^2 + (y - b)^2}$. If you would like to use built in commands, you may use the Math library located in java.lang. (does not need to be imported). Relevant functions would be **Math.pow** and **Math.sqrt**.

Next, override the **toString** method to print out the origin, destination, and distance, and the **compareTo** method to compare the objects of the class based upon distance.

Finally, finish the file **lab11.java** by storing the distance between Philadelphia and each of the other provided cities in an generic **ArrayList** of **TravelPlan** objects. Sort the list of **TravelPlan** objects using the **Collections.sort** static method. Finally, print the list to see the Travel Plans in order of shortest trip to longest. To submit the lab, create a zip folder containing the files **City.java**, **TravelPlan.java**, and **lab11.java** and submit it on Blackboard

Rubric:

- (5 points) Compiles without errors.
- (5 points) **City** class correctly implemented.
- (15 points) **TravelPlan** class correctly implemented.
- (5 points) driver program correctly implemented.

Deliverables: Submit on Blackboard.