3. This question involves the analysis of weather data. The following `WeatherData` class has an instance variable, `temperatures`, which contains the daily high temperatures recorded on consecutive days at a particular location. The class also contains methods used to analyze that data. You will write two methods of the `WeatherData` class.

```
public class WeatherData
{
    /** Guaranteed not to be null and to contain only non-null entries */
    private ArrayList<Double> temperatures;

    /**
     *   Cleans the data by removing from temperatures all values that are less than
     *   lower and all values that are greater than upper, as described in part (a)
     */
    public void cleanData(double lower, double upper)
    {   /* to be implemented in part (a) */   }

    /**
     *   Returns the length of the longest heat wave found in temperatures, as described in
     *   part (b)
     *   Precondition: There is at least one heat wave in temperatures based on threshold.
     */
    public int longestHeatWave(double threshold)
    {   /* to be implemented in part (b) */   }

    // There may be instance variables, constructors, and methods that are not shown.
}
```
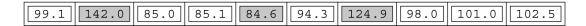
(a) Write the `cleanData` method, which modifies the `temperatures` instance variable by removing all values that are less than the `lower` parameter and all values that are greater than the `upper` parameter. The order of the remaining values in `temperatures` must be maintained.
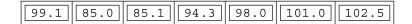
For example, consider a `WeatherData` object for which `temperatures` contains the following.

| 99.1 | 142.0 | 85.0 | 85.1 | 84.6 | 94.3 | 124.9 | 98.0 | 101.0 | 102.5 |

The three shaded values shown would be removed by the method call `cleanData(85.0, 120.0)`.

| 99.1 | 142.0 | 85.0 | 85.1 | 84.6 | 94.3 | 124.9 | 98.0 | 101.0 | 102.5 |

The following shows the contents of `temperatures` after the three shaded values are removed as a result of the method call `cleanData(85.0, 120.0)`.

| 99.1 | 85.0 | 85.1 | 94.3 | 98.0 | 101.0 | 102.5 |

Complete method `cleanData`.

```
/**
 *   Cleans the data by removing from  temperatures  all values that are less than
 *    lower  and all values that are greater than  upper,  as described in part (a)
 */
public void cleanData(double lower, double upper)
```

_____

**Begin your response at the top of a new page in the separate Free Response booklet
and fill in the appropriate circle at the top of each page to indicate the question number.
If there are multiple parts to this question, write the part letter with your response.**

GO ON TO THE NEXT PAGE.

(b) Write the `longestHeatWave` method, which returns the length of the longest heat wave found in the `temperatures` instance variable. A heat wave is a sequence of two or more consecutive days with a daily high temperature greater than the parameter `threshold`. The `temperatures` instance variable is guaranteed to contain at least one heat wave based on the `threshold` parameter.
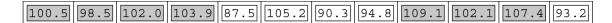
For example, consider the following contents of `temperatures`.

| 100.5 | 98.5 | 102.0 | 103.9 | 87.5 | 105.2 | 90.3 | 94.8 | 109.1 | 102.1 | 107.4 | 93.2 |

In the following sample contents of `temperatures`, all heat waves based on the `threshold` temperature of `100.5` are shaded. The method call `longestHeatWave(100.5)` would return `3`, which is the length of the longest heat wave.

| 100.5 | 98.5 | **102.0** | **103.9** | 87.5 | 105.2 | 90.3 | 94.8 | **109.1** | **102.1** | **107.4** | 93.2 |

In the following sample contents of `temperatures`, all heat waves based on the `threshold` temperature of `95.2` are shaded. The method call `longestHeatWave(95.2)` would return `4`, which is the length of the longest heat wave.

| **100.5** | **98.5** | **102.0** | **103.9** | 87.5 | 105.2 | 90.3 | 94.8 | **109.1** | **102.1** | **107.4** | 93.2 |

Complete method `longestHeatWave`.

```
/**
 *    Returns the length of the longest heat wave found in  temperatures,  as described in
 *    part (b)
 *    Precondition:  There is at least one heat wave in  temperatures  based on  threshold.
 */
public int longestHeatWave(double threshold)
```

**Begin your response at the top of a new page in the separate Free Response booklet
and fill in the appropriate circle at the top of each page to indicate the question number.
If there are multiple parts to this question, write the part letter with your response.**

Class information for this question

```
public class WeatherData

private ArrayList<Double> temperatures

public void cleanData(double lower, double upper)
public int longestHeatWave(double threshold)
```

GO ON TO THE NEXT PAGE.