***Name: Kamil Roginski  
Project: CMSC 315 Programming Project 2  
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**Lessons learned:**

Working on this project has taught me to meticulously verify that my comparison operators ('<', '>') are correctly assigned. I mistakenly used 'this.y < other.y' instead of 'this.y > other.y', causing the graph lines to display incorrectly. Furthermore, the program was restricted to reading only two data points. To help debugging, I introduced a print statement to inspect the code's output. Additionally, when I implemented the getHeight() function, the graph line unexpectedly reversed direction. To address this, I developed a temporary workaround by adding a limiter to prevent the lines from exceeding bounds.

**Big-O Analysis:**

Unfortunately, the set of maximal points is determined by checking every pair of points. Each “p” algorithm performs O(n) comparisons, and there are O(n) points. O(n) x O(n) = O(n2). This leads to the worst-case time complexity of O(n2).

**UML Diagram**

|  |
| --- |
| **MaximalPoint** |
| -------------------------------------------------- |
| - x: double |
| - y: double |
| -------------------------------------------------- |
| + MaximalPoint(x: double, y: double) |
| + getX(): double |
| + getY(): double |
| + isBelowAndLeft(other: MaximalPoint): boolean |
| + compareTo(other: MaximalPoint): int |
| + toString(): String |
| -------------------------------------------------- |
| **MaximalPointPane (extends Pane)** |
| -------------------------------------------------- |
| - points: ArrayList<MaximalPoint> |
| - pointCircles: ArrayList<Circle> |
| - POINT\_RADIUS: double |
| -------------------------------------------------- |
| + MaximalPointPane(initialPoints: ArrayList<MaximalPoint>) |
| - addPoint(x: double, y: double): void |
| - removePoint(x: double, y: double): void |
| - drawPoints(): void |
| - computeAndDrawMaximalPoints(): void |
| - findMaximalPoints(): ArrayList<MaximalPoint> |
| -------------------------------------------------- |
| **MaximalPointsApp (extends Application)** |
| -------------------------------------------------- |
| + start(primaryStage: Stage): void |
| - readPointsFromFile(filename: String): ArrayList<MaximalPoint> |
| + main(args: String[]): void |

**Test Table**

|  |  |  |
| --- | --- | --- |
| Test | Description | Outcome |
| TC01 | Verify that getX() and getY() return the correct coordinates. | Methods return the accurate x and y coordinates. |
| TC02 | Use test file (points.txt) to verify that all points are correctly parsed. | All points are accurately parsed. |
| TC03 | Test error handling when the file does not exist. | Application gracefully handles the error, possibly by displaying an appropriate message or creating a new file. |
| TC04 | Left-click on the pane to add a new point and confirm that it appears and the maximal set is recalculated. | New point is displayed, and the maximal set updates accordingly. |

**Test Case 1:**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Test Case 2:**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Test Case 3 (File name changed to “points2.txt”):**

**A screen shot of a computer

AI-generated content may be incorrect.**

**Test Case 4:**

**A screenshot of a computer

AI-generated content may be incorrect.**