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Slow Convex Hull Analysis:

I used a simple brute force method to compute the convex hull for this program. To determine if an oriented edge $P_i \rightarrow P_j$ is part of the convex hull (listed in counterclockwise order), the algorithm verifies that all points P_k (with k≠i and k≠j) are located on the left hand side of $P_i \rightarrow P_j$. I simply add this line segment if it all other points are on the left hand side of it. As I started from the order in which the points were formatted, the smallest indexed point starts the hull, and it ends up being in counter-clockwise order.

I created a new Edge class to store the line segments, which were made of a source point and destination point. The points were stored in Point objects. (Note: I preferred not to use the Point2D class). These edges were stored into an array of type Edge, and are what form the convex hull.

Worst Case Time Complexity:

$\sim N^3$, where N is the number of points input.

Fast Convex Hull Analysis:

I used the algorithm provided in the lab handout to compute the convex hull for this program. To sort the points, I used the sort function provided by the package java.util, which is a part of the Arrays class to sort the points in ascending and descending order for the algorithm.

I used a Deque to store the points in the lower and upper halves, as this seemed to help with the dynamically sizing aspect. The properties of a Deque helped traversing through the points on the convex hull when I needed to sort the hull in counter-clockwise order starting from the smallest index. The removing of points and the appending of points into the halves further confirmed that a Deque would be apt to store the points. Finally, I stored the convex hull points in an array of type Point.

Worst Case Time Complexity:

$\sim N\log_2 N$, where N is the number of points input.

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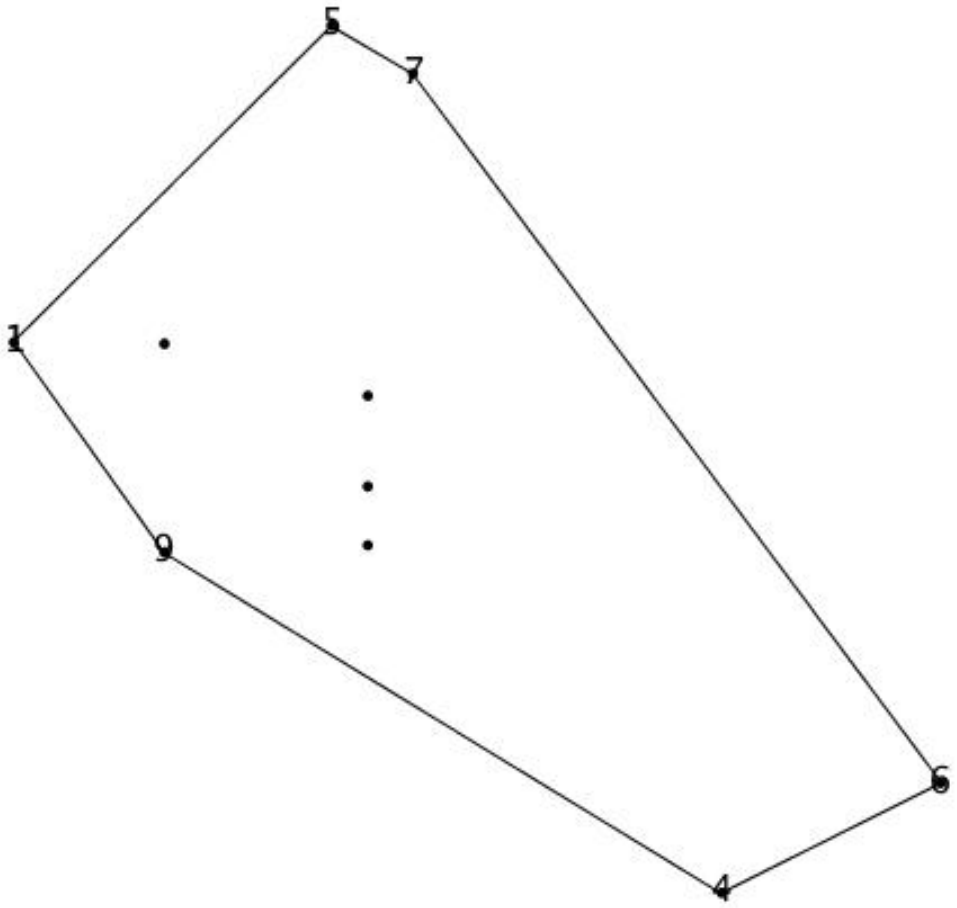
Visualizations of Test Cases (Fast Convex Hull):



Test Case: 10.txt

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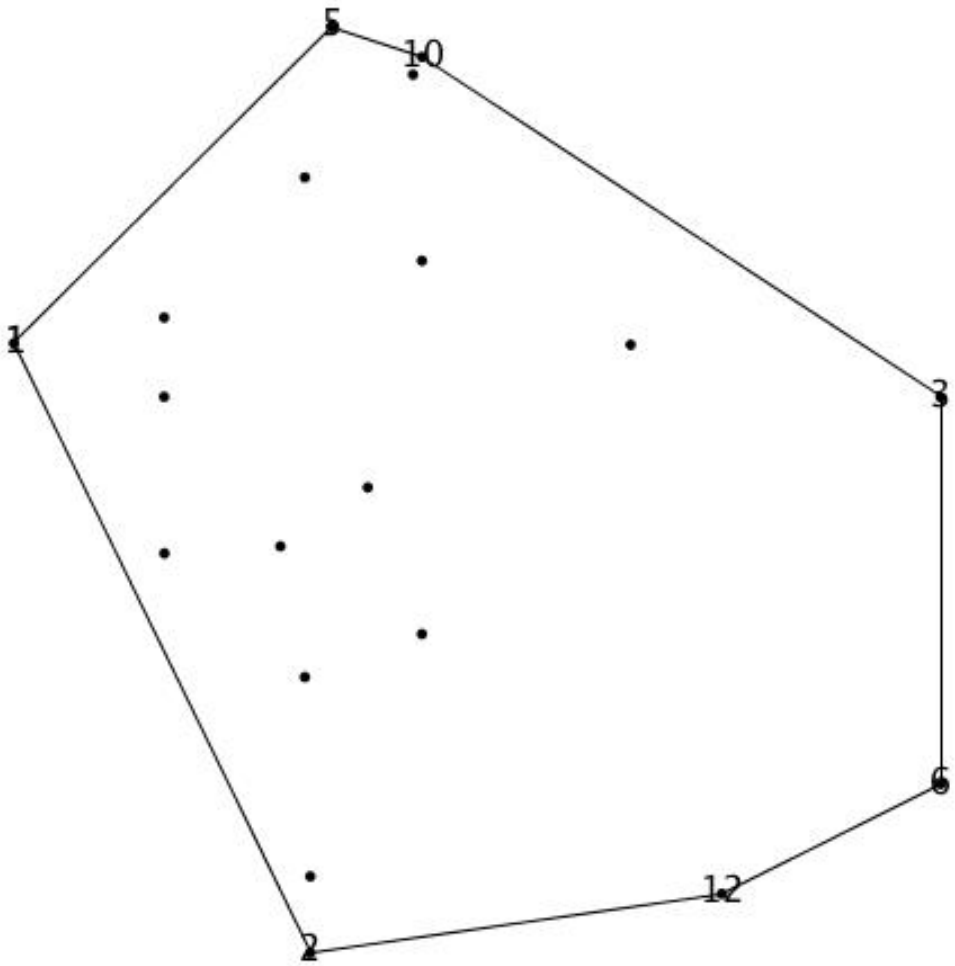

Test Case: 20.txt

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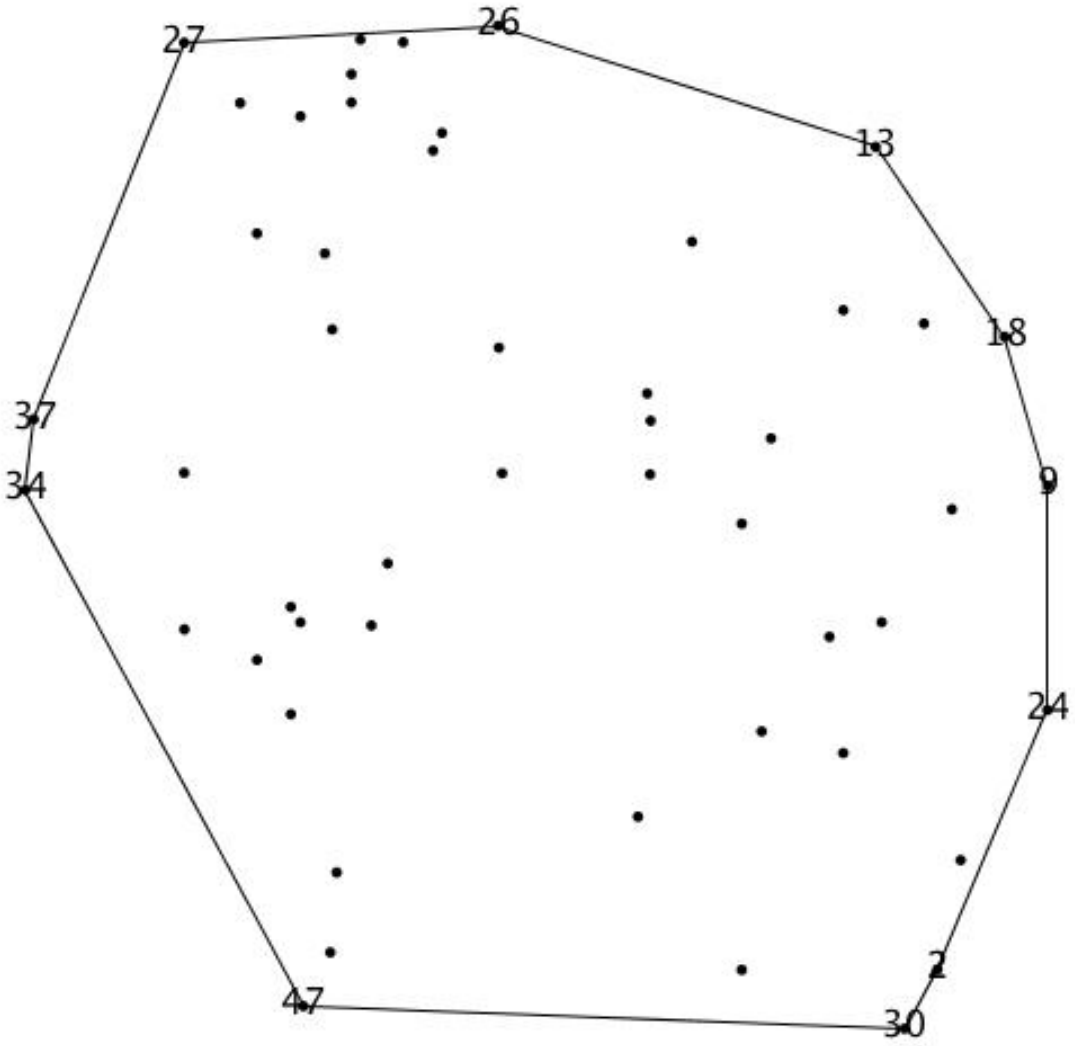

Test Case: 50.txt

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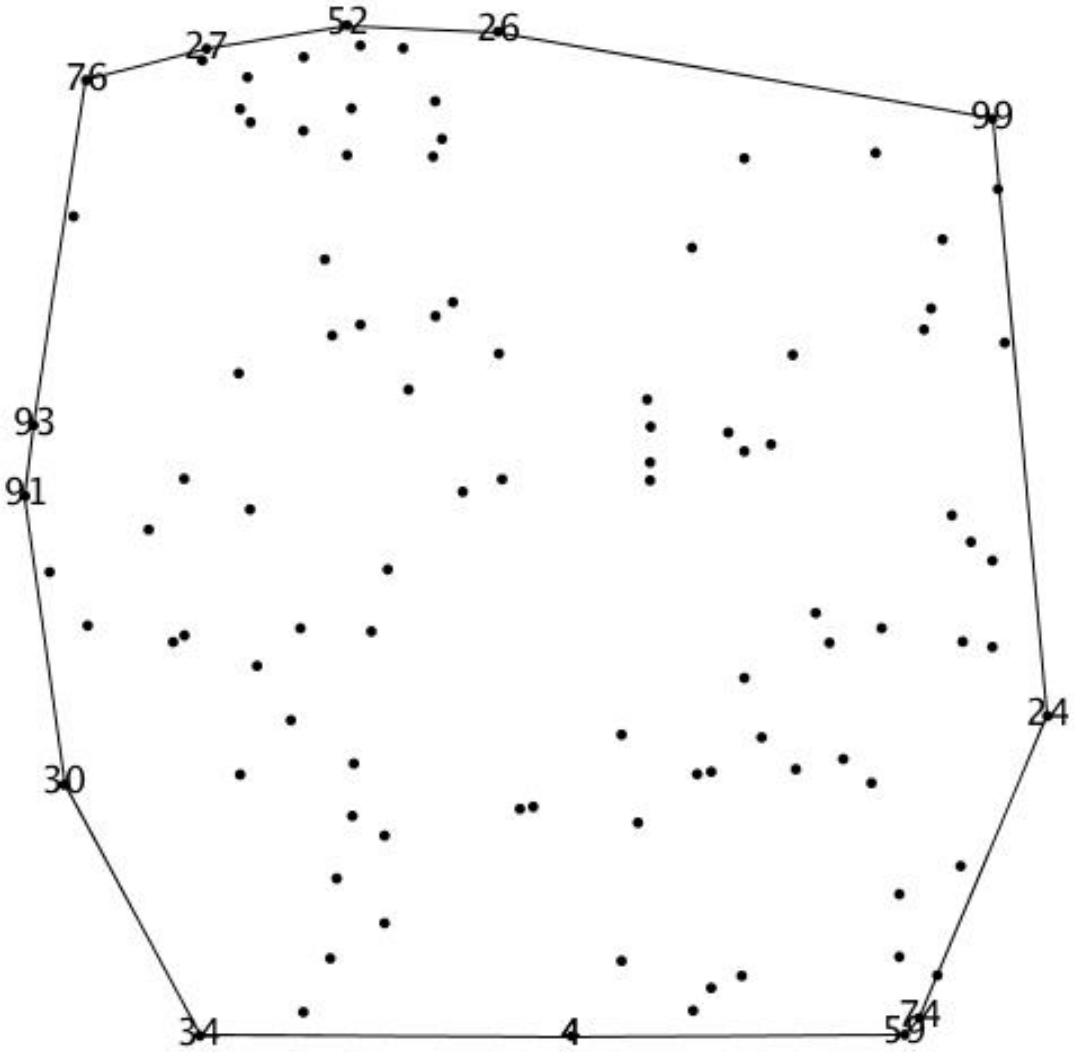

Test Case: 100.txt

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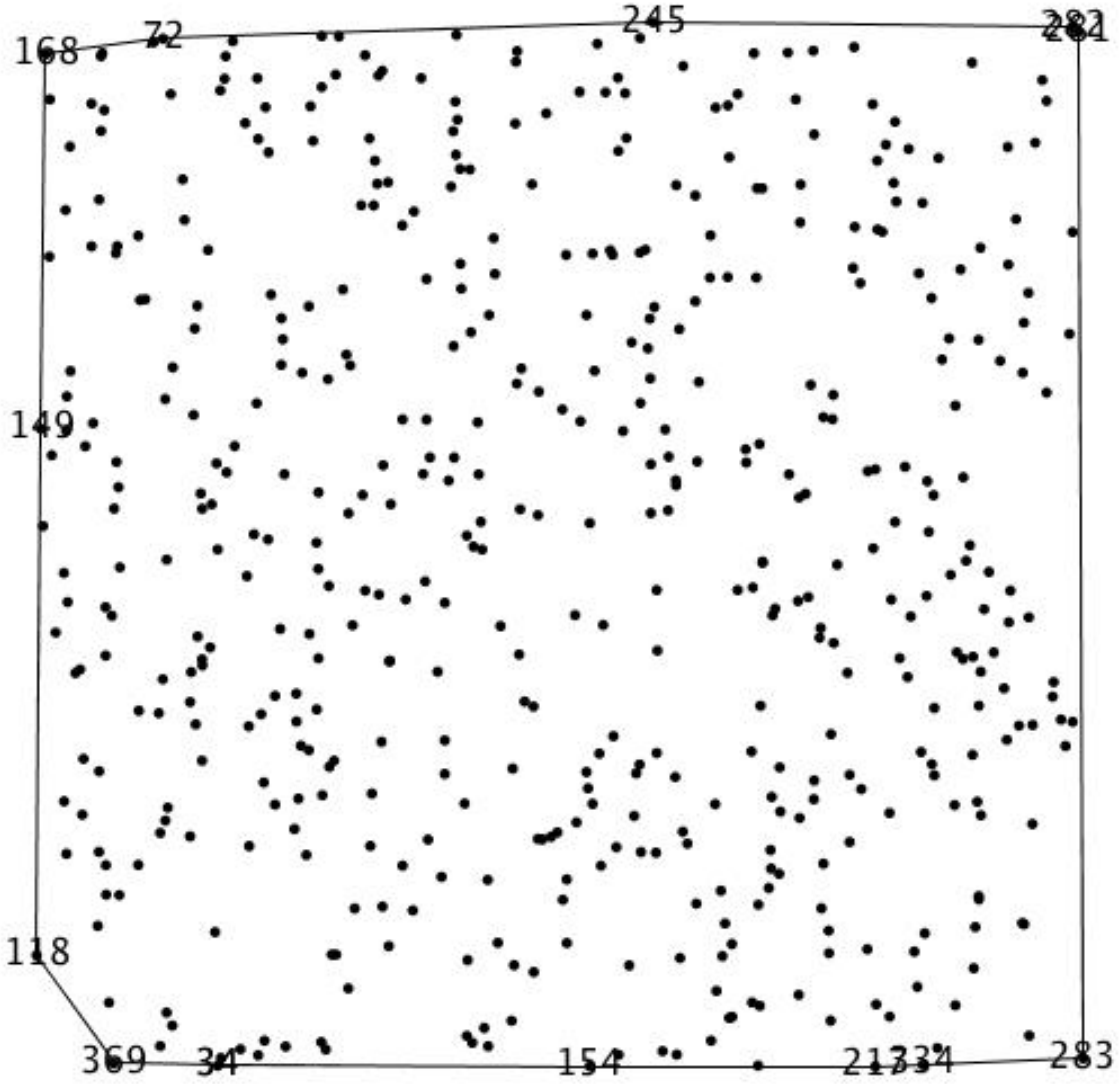

Test Case: 500.txt