Gift Wrapping Algorithm
MATH 261 Computational Geometry

Input: a set S of n points in the plane, specified by xy-coordinates

Output: a list L of vertices of $\text{conv}(S)$ in counterclockwise order

Algorithm:

1. Start with the lowest point in S (if there is a tie, choose the rightmost).

2. Draw lines from the starting point to all other points in S. The point whose line makes the largest angle with the negative horizontal axis is the next point on the hull.

3. Repeat #2, working counterclockwise around the hull. When you return to the starting point, you are done.

Answer the following questions:

1. Draw your own set of points. Work through the gift-wrapping algorithm by hand to find the convex hull of your points.

2. The algorithm above is phrased in terms of angles, but we've said that computing angles is computationally expensive and prone to numerical errors. How could you implement the algorithm using LeftOf queries instead?

3. What is the computational complexity of the gift wrapping algorithm?

4. On the course website you will find an incomplete Mathematica implementation of the gift wrapping algorithm. Fill in the missing code to complete the implementation.