On the distribution of overlapping area of two random polygon (30 Point)

The Problem

Part I:

Take a unit square, randomly choose N red points and N blue points inside it. Find their convex hull, and to each convex hull assign a polygon. Call their overlapping area (which is always between 0 and 1) X. your task is to find the distribution of X and to plot it. Plot it for (N=5,10,15,100,200,500,4000)

* Also you must have a program to visualize a random polygon.

Part II:

What is the expected area of a random convex N-gon inside a convex set K? K can be a square, circle, triangle etc. for large N, how does the function E(n) behaves? E is the Expected Area of a random convex N-gon where the N vertices lie inside a set K.

Plot E(n) for three case: K is a square. K is a circle. K is a triangle.

Things you must learn:

-What is a convex hull?

-How can I find the convex hull of a set of points? (For example one algorithm is Graham Scan, which you can look up and implement)

Besides this, there isn’t much you’ll need besides knowing a programming language.