

# CMPE 365 Lab 3

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## Part 1

For this assignment, I implemented the Jarvis' March method of computing the convex hull of a set of points. Using sets of 100 points with a uniform distribution, about 12% of the points in the set are included in the convex hull. Out of curiosity, I changed the number of points in the set to determine if this changes the percentage of the points on the convex hull. It turns out that this does change the percentage of points on the convex hull. If the set has 1000 points, the percentage of points on the hull is about 1.8%, and if the set has 10000 points, the percentage of points on the hull is about 0.24%.

## Part 2

Using sets of 100 points with a uniform distribution, about 8.8% of the points in the set are included in the convex hull. Again, this number changes with the size of the set. If the set has 1000 points, the percentage of points on the hull is about 1.15%, and if the set has 10000 points, the percentage of points on the hull is about 0.13%. The percentage of points on the convex hull is less for a normally distributed set than for a uniformly distributed set because the points are more likely to be in the middle of the set.

## Part 3

The results of the code show that even if the convex hulls of two sets don't intersect, the bounding circles might intersect and give a false result. Interestingly, the number of times the program says that the convex hulls overlap when they really don't is about 80% for both normally and uniformly distributed sets. This also doesn't change much as the value of  $n$  increases.

## Part 4

Yay it works! If points are colinear (between the two hulls) the hulls will not intersect because if three points are colinear the third point is not considered left of the line through the other two (according to my `left()` function). If there is a point on both hulls the hulls are not said to overlap for the same reason - the point will be on the line between itself and any other point, so is not on the left of this line.