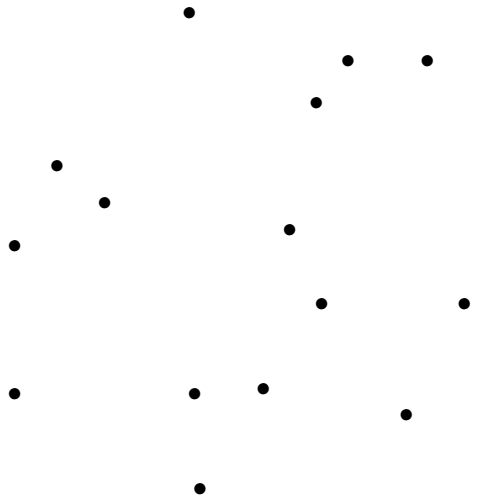
Convex Hulls

MATH 261 Computational Geometry

1. Let S be a set of points in the plane. Given points a and b in S, how would you determine whether the segment ab is part of the convex hull $\text{conv}(S)$?

Here is a sample set of points S:



2. Given the coordinates of all points in S, how would you program a computer to determine whether a particular pair of points in S are endpoints of an edge of $\text{conv}(S)$?

Here is a sample set of points, specified by coordinates:

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(0.9, 4.7)
(1.1, 9.3)
(6.6, 2.5)
(8.2, 1.8)
(6.8, 8.1)
(4.7, 7.3)
(3.8, 1.5)
(5.0, 2.9)
(2.6, 5.2)
(5.9, 6.4)
```

3. Given the coordinates of all points in S, how would you program a computer to find *all* edges of $\text{conv}(S)$?

4. How many operations would your algorithm require to find the convex hull of 10 points? ...of 100 points? ...of 1000 points?