

How Many Triangles in a Triangulation?

MATH 261 Computational Geometry

Suppose point set S has h points on its convex hull and k points in its interior. (Assume the points of S are not all collinear.) Let planar graph G be a triangulation of S .

Use the following steps and Euler's formula to determine t , the number of triangles in G .

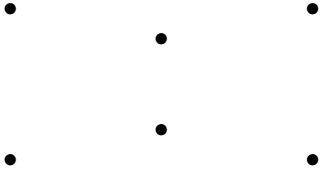
1. Express V , the number of vertices of G , in terms of h and k .
2. Express F , the number of faces of G , in terms of t .
3. Express E , the number of edges of G , in terms of h , k , and t . To do this, count the edges of each triangular face, then add the edges of the unbounded exterior face.
4. Express Euler's formula in terms of h , k , and t . Then solve for t .

Bonus: How many edges are in G ?

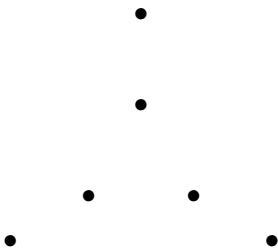
Flip Graphs

MATH 261 Computational Geometry

1. Construct the flip graph for the following point set.



2. Construct the flip graph for the following point set.



3. Let S be the 3×3 grid of points, shown below. Find triangulations T_1 and T_2 of S such that the number of edge flips required to transform T_1 into T_2 is as large as possible. (This gives the *diameter* of the flip graph of S).

