**Triangulations of point sets**
**— Open problems (more will be added) —**

# Dimension 2

1. Is there a number $N$ such that every set of points in the plane which has a non-regular triangulation, contains a subset of at most $N$ points which already have a non-regular triangulation? (The conjecture is "Yes, $N = 8$").

2. Is the graph of triangulations of every 2-dimensional point set $(n-3)$-connected? (We at least know that all triangulations have at least $n-3$ flips.

3. Let $A$ be a set of $n$ points in the plane, and let us look at the triangulations of $A$ **that use all the vertices**.

   - Prove there are at most $8^n$ of them. The best known upper bound is $59^n$.

     Note (or exercise): if you prove an upper bound of $c^n$ for the triangulations that use all the vertices, this implies an upper bound of $(c+1)^n$ for the total number of triangulations of the point set.

   - Prove that if $A$ is in general position (no 3 points colliear) then there are at least $\sqrt{12}^n$ triangulations, modulo a polynomial factor. The best known lower bound is something like $2.1^n$.

# Dimension 3

1. Prove that the graph of triangulations of every point set in dimension 3 is connected, or find an example where it is not.

   This is open even if you assume that your points are in convex and general position. That is, they are the vertices of a polytope and no four of them lie in a hyperplane.

2. If you succeeded in proving the above for points in convex position, try to prove that the graph is $(n-4)$-connected. We at least know that every triangulation has $n-4$ flips (in copnvex position).