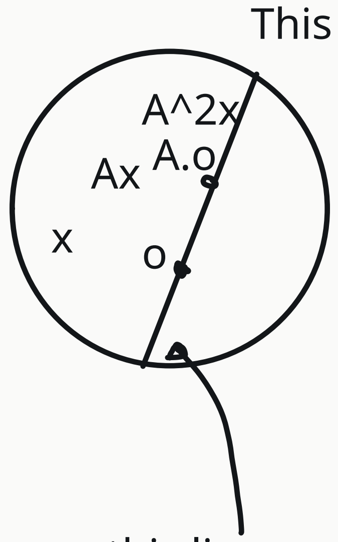
Let A be a nxn invertible matrix. The singular values of A are the (square roots of the) eigenvalues of AA^t. They are all positive, and typically you order them in decreasing order.

This is a convex set in RP2 and A is in SL(3,R)



Look at the shortest path between o and Ao ~ eigenvalues of A

The green curve and the red curve give you
Two different 3x3 matrices which are conjugate.
They have the same eigenvalues! Same length!

A preserves this line and it translates points on this line by log(top evalue of A/bottom evalue of A)
Issue: distance between x and Ax is no longer expressed by eigenvalues of A, it’s a little bit bigger

log #{c closed curve: l(c)<N}/N when N is really large = entropy

We don’t want to keep track of both the red and the green!

The singular values fix this problem for us!

Fix a base point in your convex set x. Then, for every matrix A, log(largest sing value of A/smallest sing value of A) ~ d(x, Ax) even if x is not on the axis of A.

log#{A matrix: log(top sing value/bottom sing value of A)<N}/N when N is really large = entropy (Theorem)