Let be the set of all symmetric matrices (of dimension 3).

A blue triangle shaped object with a point

Description automatically generated with medium confidenceHence, we can describe them as and represent them as . That means, that each point corresponds to symmetric matrix.

Let be the set of all psd matrices (2x2). This is represented by the group (Sylvester's theorem).

Let and let .

A blue and silver graph with a point on the center

Description automatically generated with medium confidenceNow, define . Say ,

We can describe as which is a parametric equation of a line.

A blue and orange cone with a point on the center

Description automatically generated with medium confidenceNow we want the intersection of with . In other words, and .

So, the intersection of this line with is the same line but restricted to the cone (in yellow).

To finish with, we take a plane that contains . I chose plane :

And the intersection is:

Which is infinite 2d cone (the line bolded in purple).

A blue and orange graph

Description automatically generated

The full guided simulation is here: <https://www.desmos.com/3d/8f904f3eaa>

Appendix for myself: let , I will prove that is PSD:

Two things should hold. is trivial.

For the second minor, recall from the averaging theorem inequality that: