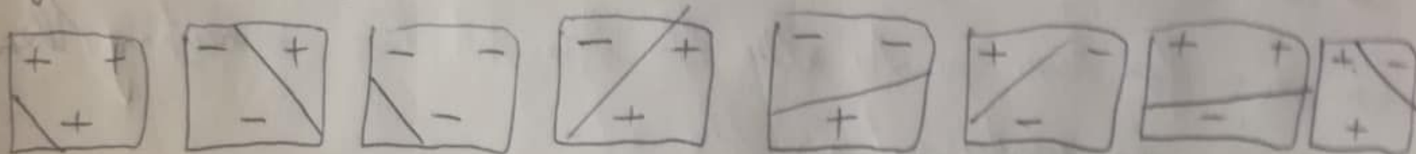
A configuration of N points is just any placement of N points. In order to have VC-dim. of N, a classifier must

A) Shatter a *single* configuration of N points, ie. it must be able to, for every possible assignment of two labels, perfectly partition the plane such that the labels are separated by the classifier.

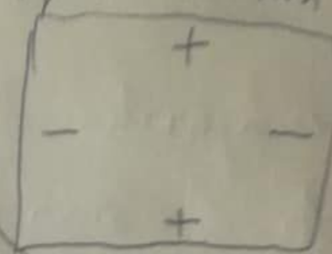
E.g.: VC-dim. of linear classifier (ie. lines in the plane) is ≥ 3:



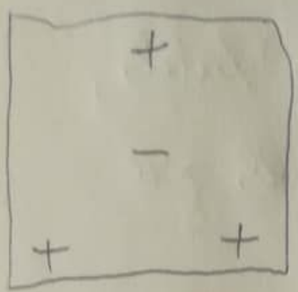
It *doesn't* mean, that any configuration of N points can be shattered, e.g. $\boxed{+ \quad - \quad +}$ can't be ~~shattered~~ separated by one line.

B) *not* be able to shatter *any* configuration of $N+1$ points. For the linear classifier, we thus need to show, that there doesn't exist a four point configuration that can be shattered. Two main cases have to be considered:

a) All four points lie on the convex hull defined by the four points. The following picture indicates this situation and a labelling that can't be shattered:



b) Three of the four points lie on the convex hull, the remaining one is internal. Then the following labelling can't be separated:



Convex hull of a set X = Smallest convex set containing X

Convex = for two points also the straight line connecting them is contained in the set.