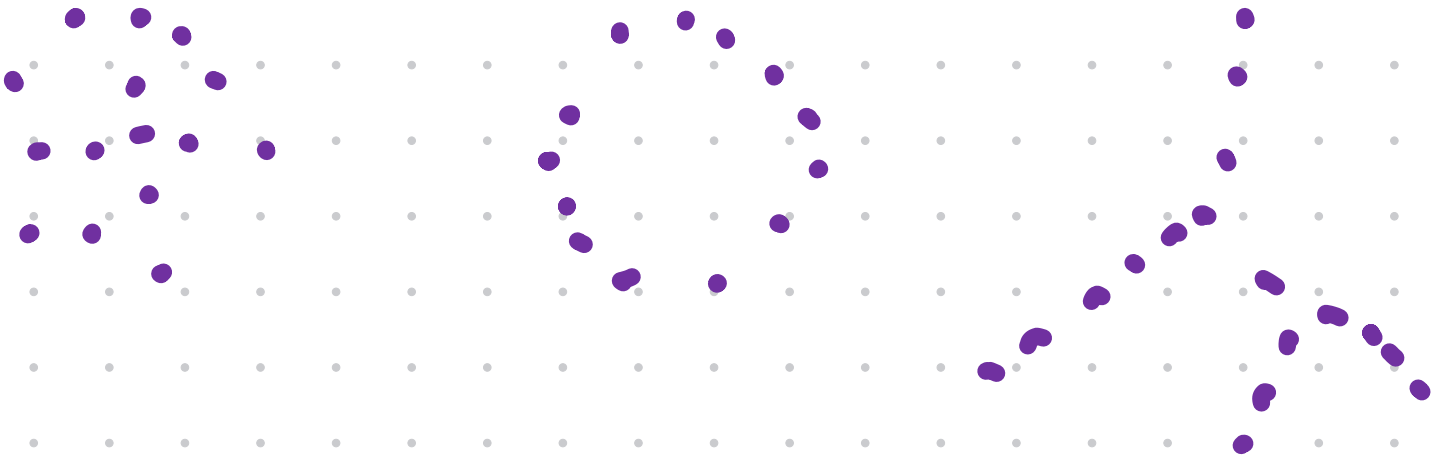
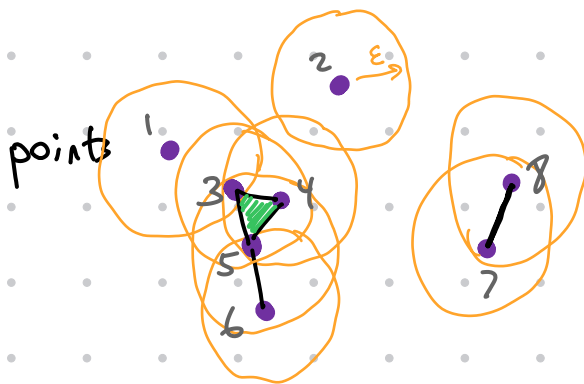


# SIMPLICIAL COMPLEXES FROM POINT CLOUDS



## VIETORIS-RIPS COMPLEX



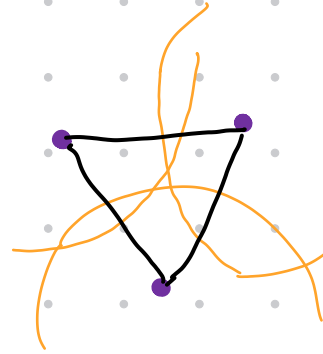
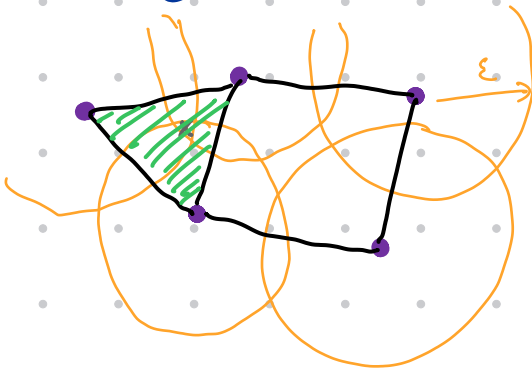
parameter:  $\epsilon > 0$

$$VR_{\epsilon}(S) = \{ \{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}, \{7\}, \{8\}, \{3,4\}, \{4,5\}, \{3,5\}, \{5,6\}, \{7,8\}, \{3,4,5\} \}$$

Given a set of points  $S$  in  $\mathbb{R}^n$  and a threshold parameter  $\epsilon > 0$ , the Vietoris-Rips complex  $VR_{\epsilon}(S)$  consists of all subsets of points that are pairwise within distance  $\epsilon$ .

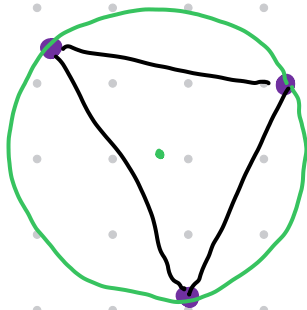
# ČECH COMPLEX:

points  
parameter  $\epsilon > 0$



For a set of points  $S$  in  $\mathbb{R}^n$  and a threshold parameter  $\epsilon > 0$ , the Čech complex  $C_\epsilon(S)$  is the complex whose simplices consist of all subsets of points in  $S$  with mutually-intersecting  $\epsilon$ -neighborhoods.

disks of radius  $\epsilon$  centered at the point



circumcircle of the triangle





