Lecture 4 - Exercise

VC - Dimension of hypothesis space

$$h(x) = \begin{cases} +1 & \text{if } a \leq x \leq b \\ -1 & \text{otherwise.} \end{cases}$$

VC Dimension of a hypothesis space defined over an instance space X is the size of the largest finite subset of X shattered by H.

The case with 1 point is trivial

Lets consider 2 points.

4 possibilities in total :- $(+1, +1)$, $(+1, -1)$, $(-1, -1)$, $(-1, +1)$ and clearly these all cases can be shattered by H.

Now, if we consider for 3 points :- Consider the case where the function outputs are $+1, -1, +1$

This implies that x_1 & x_3 both follows $a \leq x_1, x_3 \leq b$. But that means that x_2 cannot be between a & b, because its -1. & therfore it cannot be shattered. So we have V.C Dimension of this space = 2