Q1. Hypothesis space — set of all possible legal hypothesis, set from which ml determine best possible

(a) The parameter is the radius r if each of the points distance from the origin is greater than or equal to r.

The classifier follows the set of rules stated above.

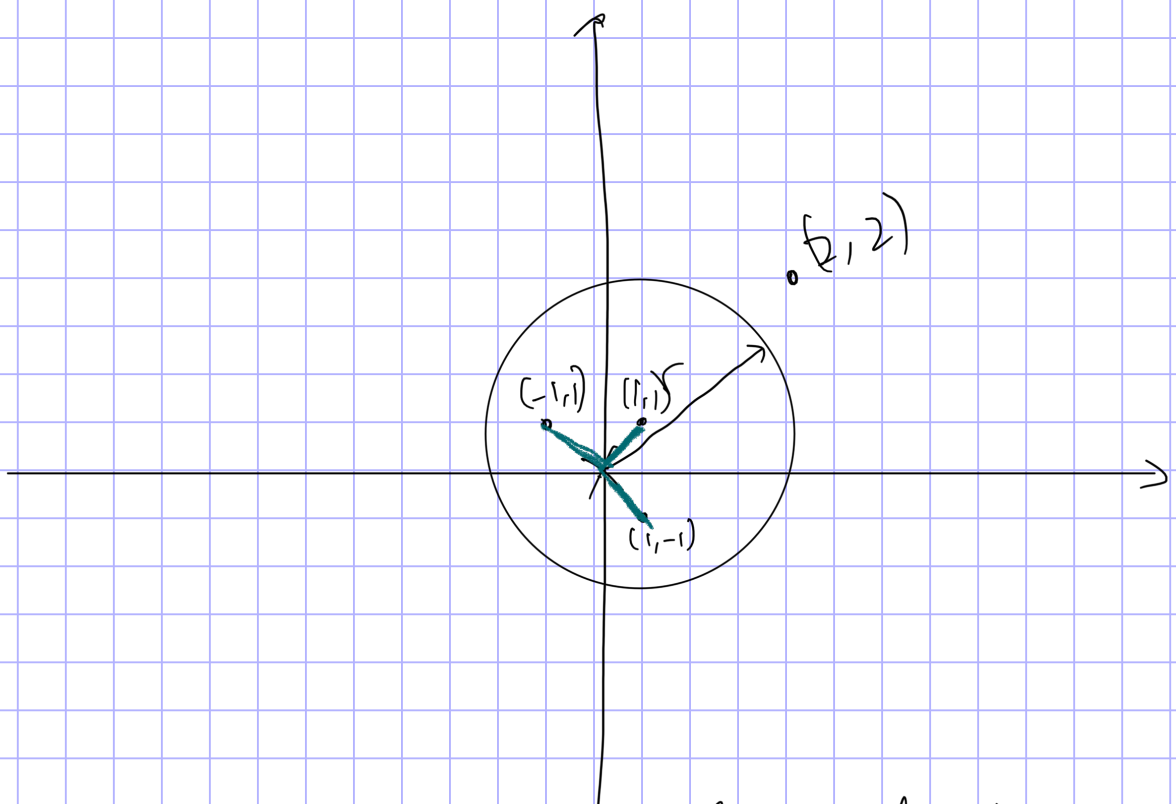
(1) If the distance of the point from the origin is more than r, the point lies outside the circle

(2) If the point lies on the circumference of the circle or the distance of the point from the center is larger than r, the point is outside the circle

We assume that whatever points that lie on the circumference line is inside the circle.

$h: X \Rightarrow Y$, y is a categorical variable that states the point that lies inside or outside of the circle.

$$h = \sqrt{(x_1 - 0)^2 + (x_2 - 0)^2} > r$$

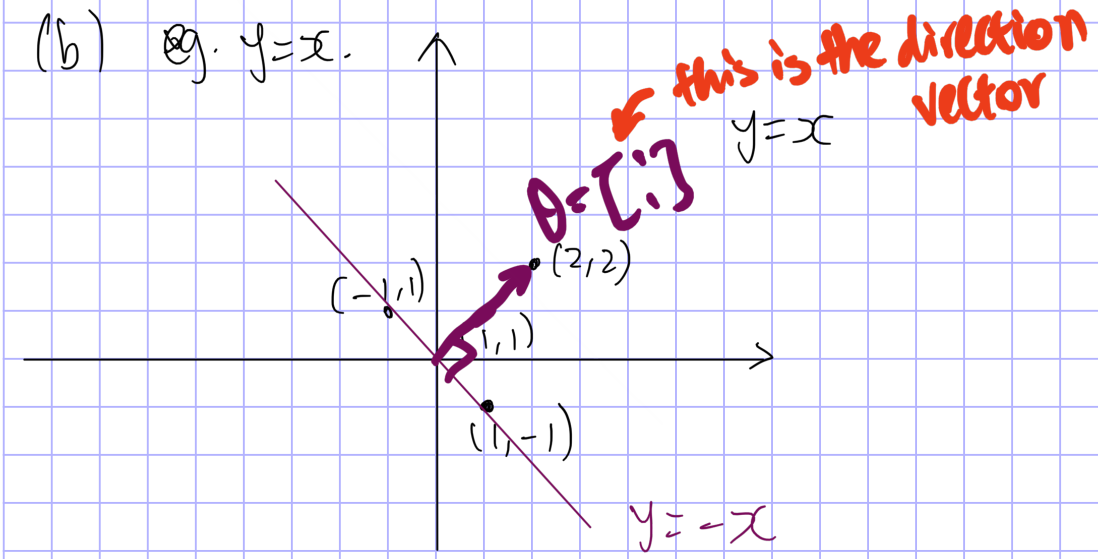


Based on the diagram above, we can not find the classifier.

First, the green line demonstrates that the points are of the

Same distance from the origin $\sqrt{2}$. Hence, no matter what r value, we cannot classify the negative points $(-1,1)$ and $(1,-1)$ from the positive example $(1,1)$ correctly.

(b) eg. $y=x$.



The parameter is the equation of the line. Meaning the gradient

Rules: The two points that lie on the line or on the same side is in the same class. Hence, from the example above, we see from the purple line that have two positive points lie on the line and that the two negative points lie on the line (below the line) where the other two positive points lie on the other side of the line (above the line)

Hence, the examples can correctly classify between the positive and negative examples. Thus, such a classifier exists.

The decision boundary is defined as that for points below the line or that lies on the line lies below the line

$$h(x;\theta)=\begin{cases}+1, & \theta\cdot x>0\\ -1, & \theta\cdot x\leq 0\end{cases}$$

Classifier normal vector $\begin{pmatrix}r\\-r\end{pmatrix}$, $r>0$