

Exercise: Perceptron Classification

Data

$$\mathcal{D} = \left\{ \left(x_1^{(i)}, x_2^{(i)}, y^{(i)} \right) \right\}_{i=1}^N$$

$$= \left\{ \begin{array}{l} (2, 2, 1), \\ (2, 0, 1), \\ (2, -2, 1), \\ (-2, -3, -1), \\ (-2, 0, -1), \\ (-2, 3, -1) \end{array} \right\}$$

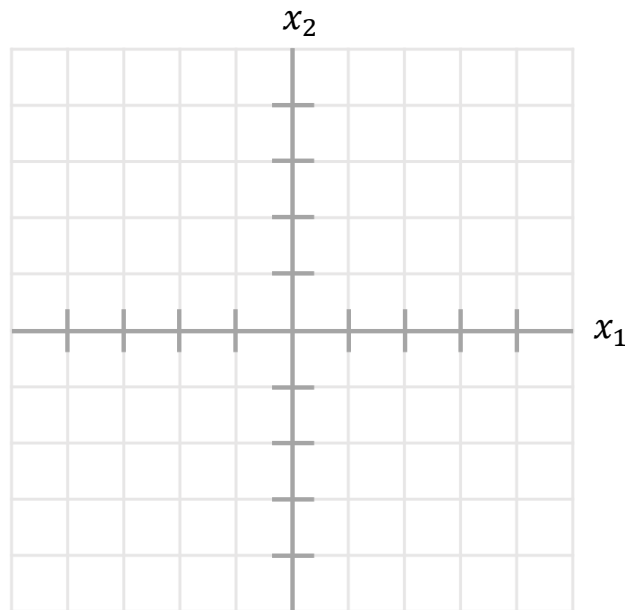
Model

$$\hat{y} = h(\mathbf{x}) = \text{sign}(\mathbf{w}^T \mathbf{x} + b)$$

with parameters

$$w_1 = -1, w_2 = 2, b = 0$$

- 1) Plot the data in \mathbb{R}^2 with two different shapes for $y = 1$ and $y = -1$
- 2) Draw the decision boundary (all the points (x_1, x_2) where $\hat{y} = 0$)
- 3) Draw the vector \mathbf{w}



- 4) How many mistakes (errors) were made with this model on this dataset?
- 5) What is the classification error rate for this model on this dataset?
- 6) What is the classification accuracy for this model on this dataset?
- 7) Fill in the confusion matrix below with the count of points in each category.

	$\hat{y} = 1$	$\hat{y} = -1$
$y = 1$	TP:	FN:
$y = -1$	FP:	TN:

TP: True positive
 TN: True negative
 FP: False positive
 FN: False negative