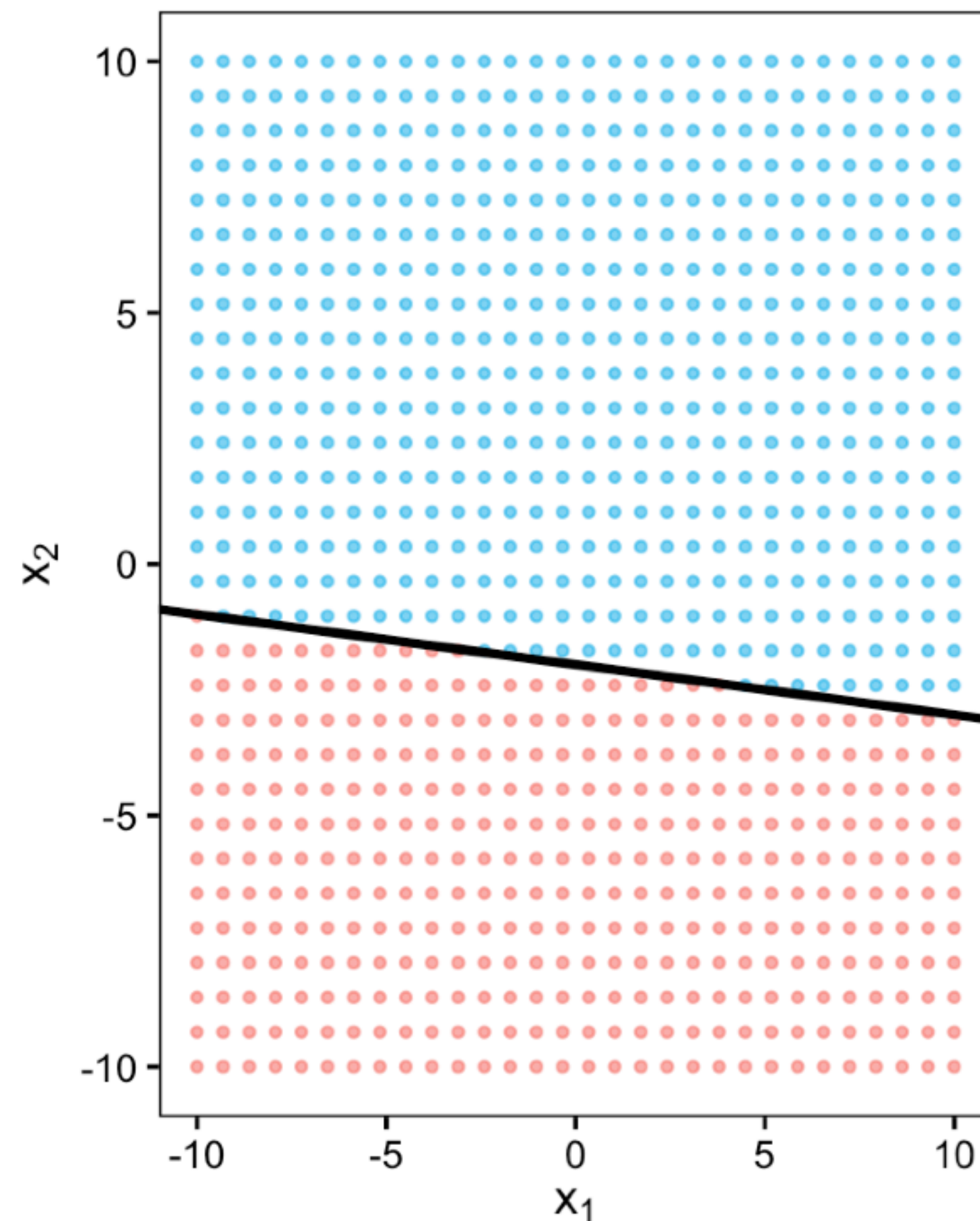
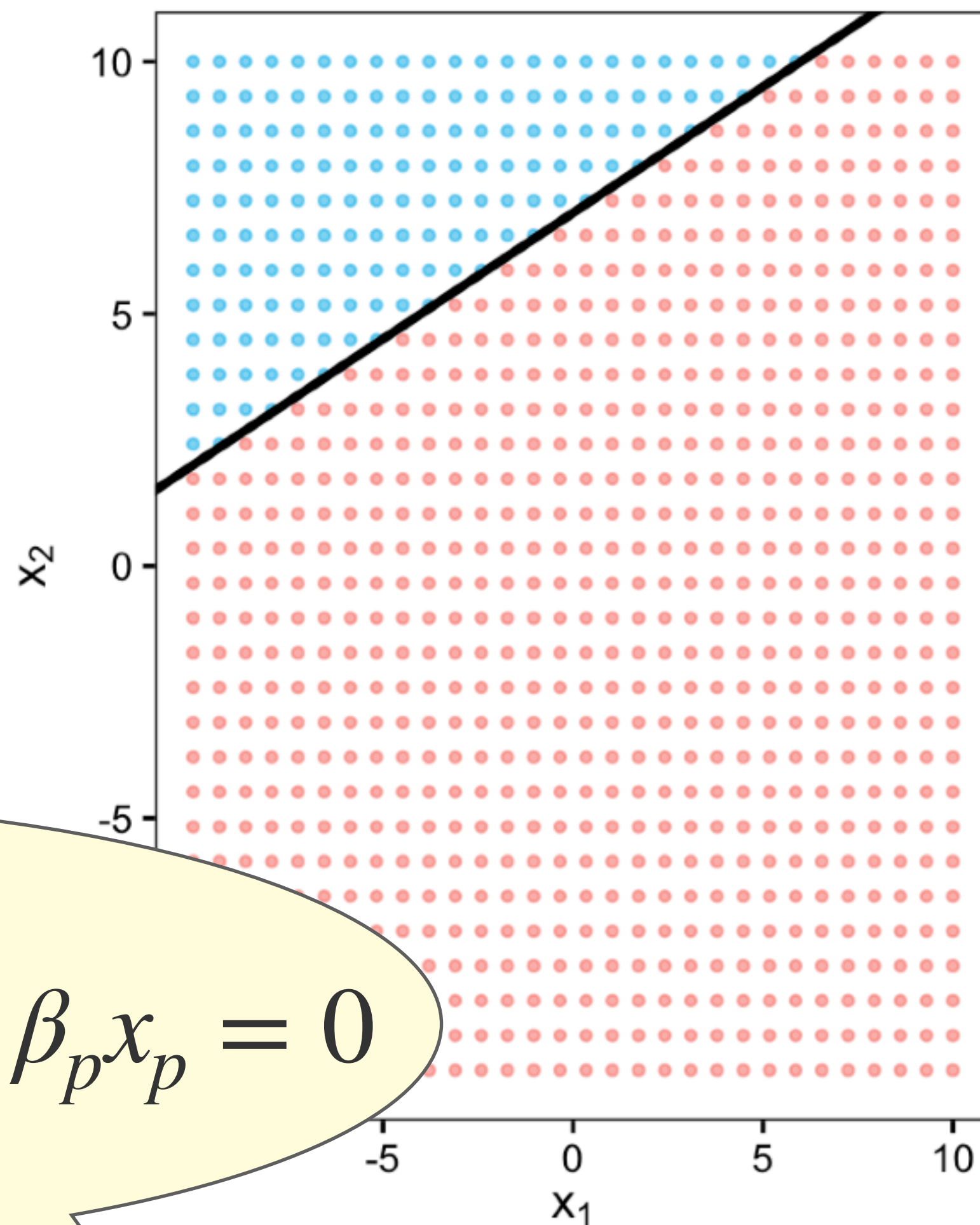
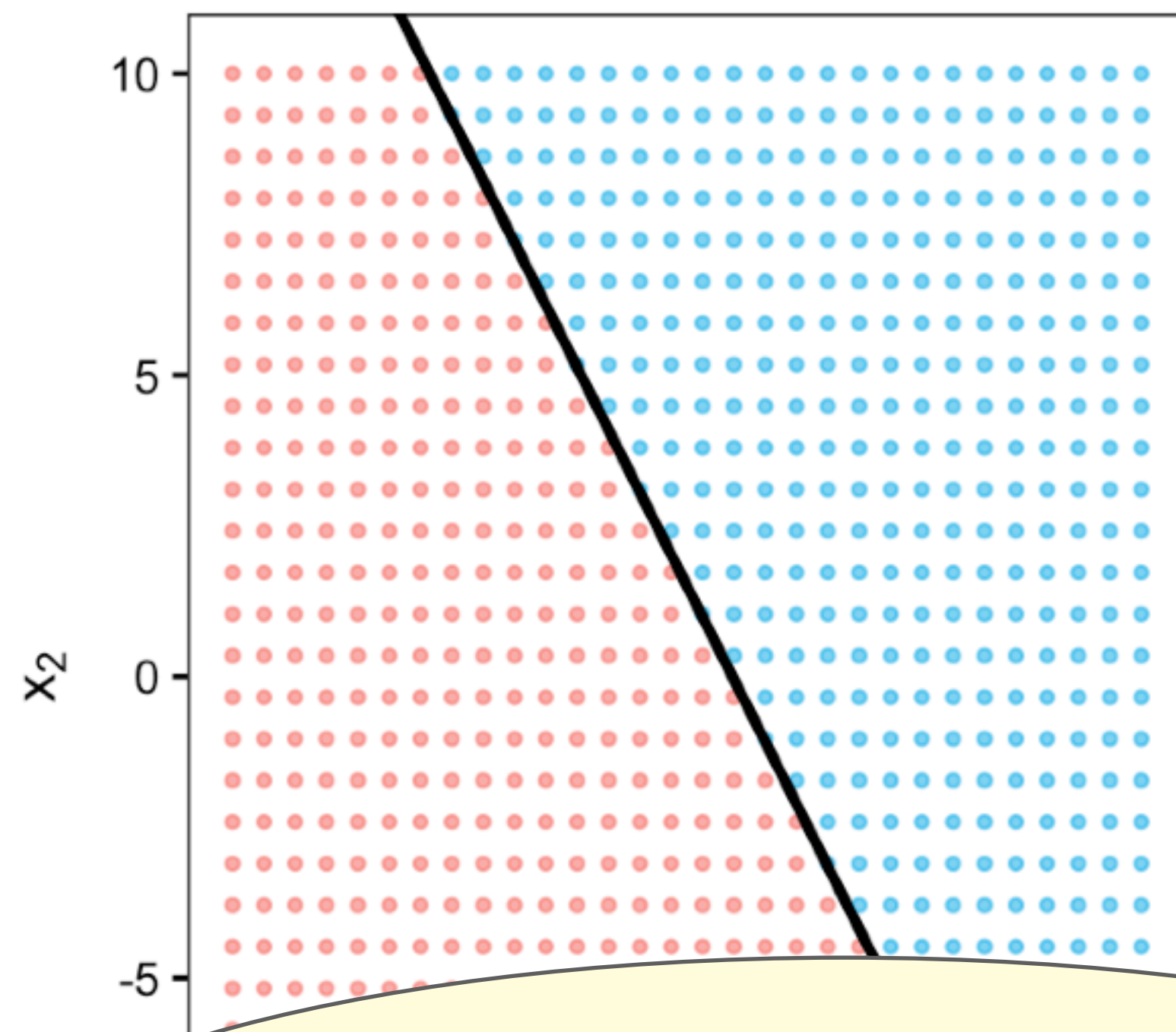


# Hyperplanes Divide the Space in Half

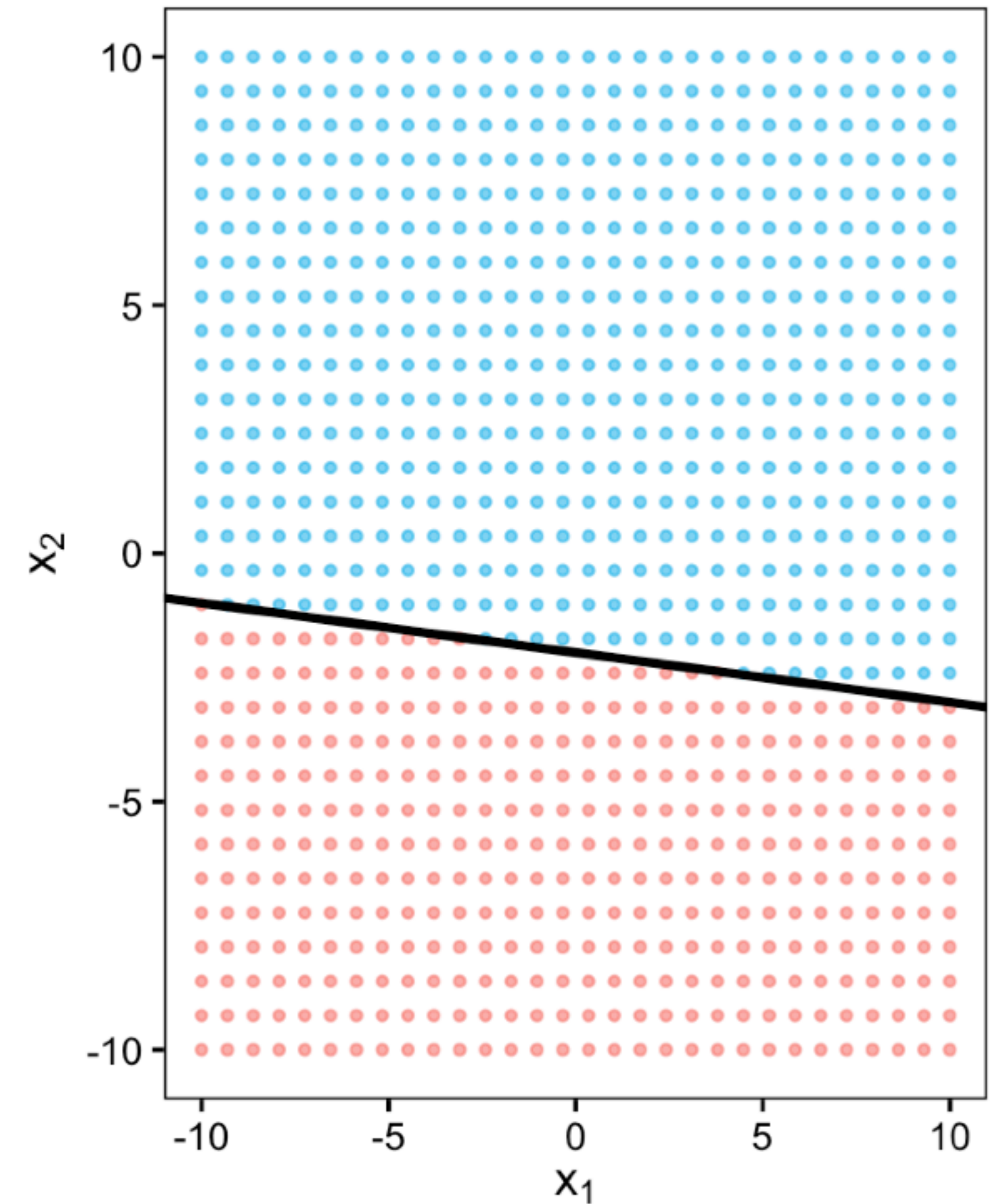
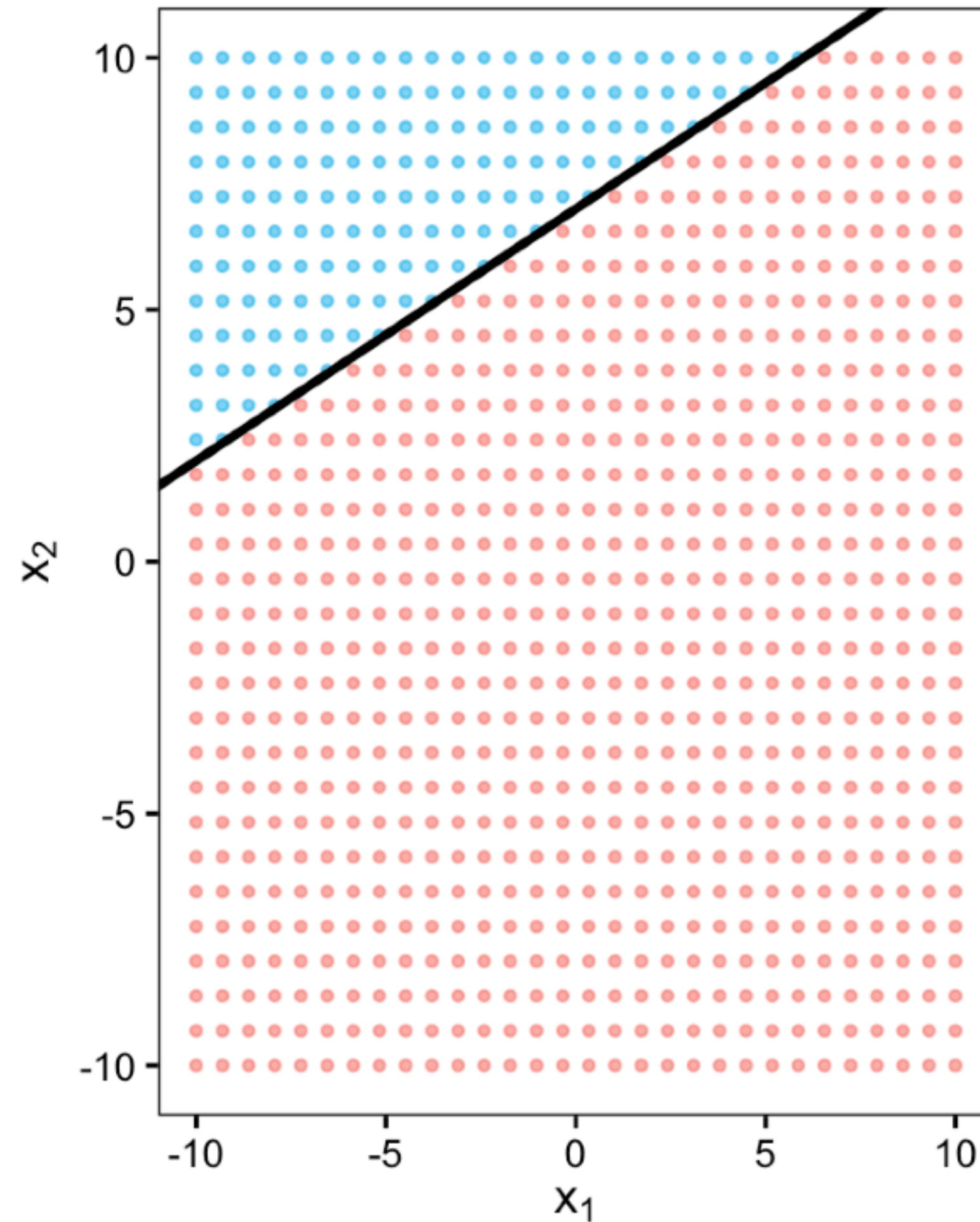
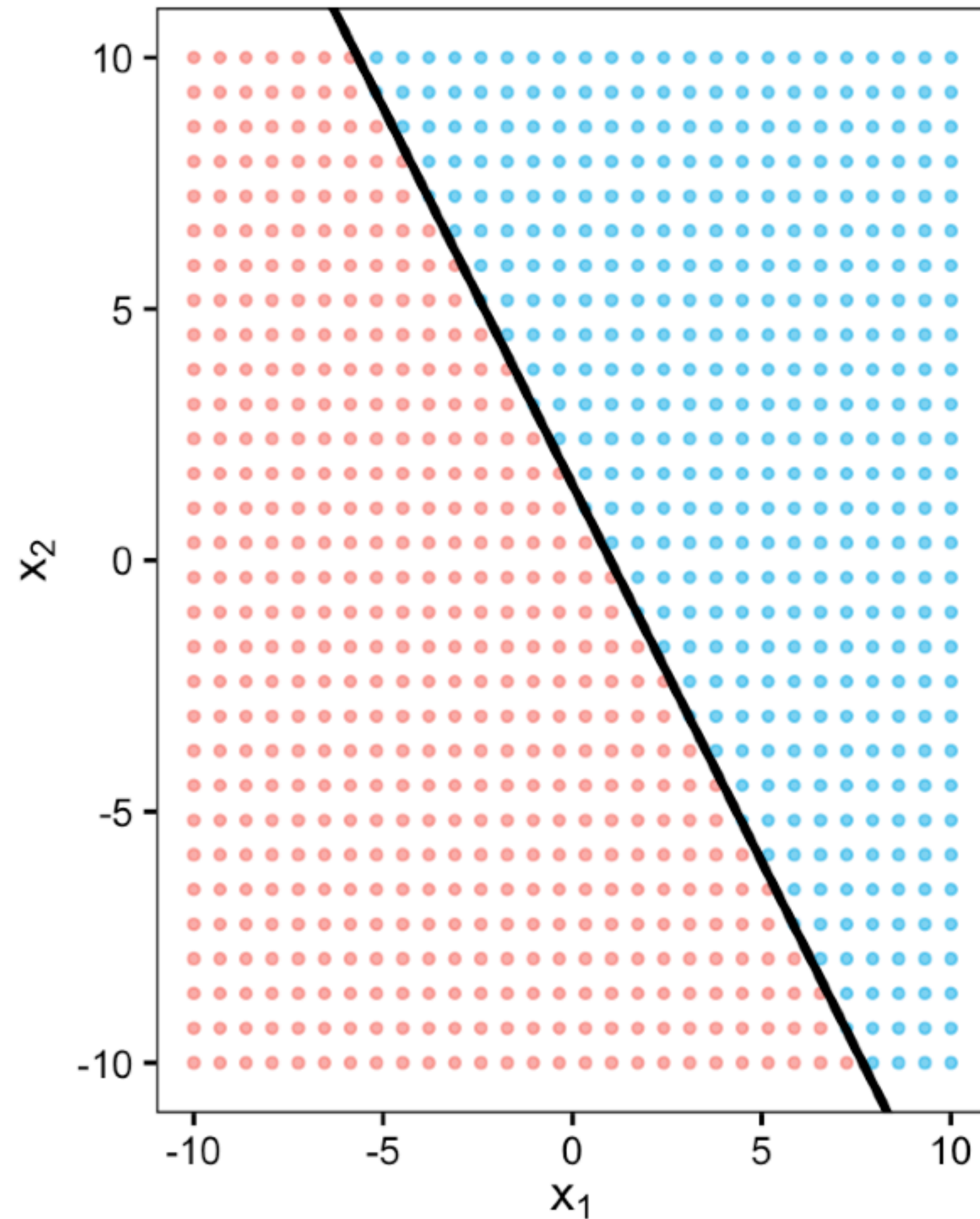


$$\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p = 0$$

$$\beta_0 + \beta^T x = 0$$



# Hyperplanes Divide Spaces in Half



$$\begin{aligned} \beta_0 + \beta^T x &> 0 \text{ if } y_i = 1 \\ \beta_0 + \beta^T x &< 0 \text{ if } y_i = -1 \end{aligned} \implies y_i(\beta_0 + \beta^T x) > 0$$