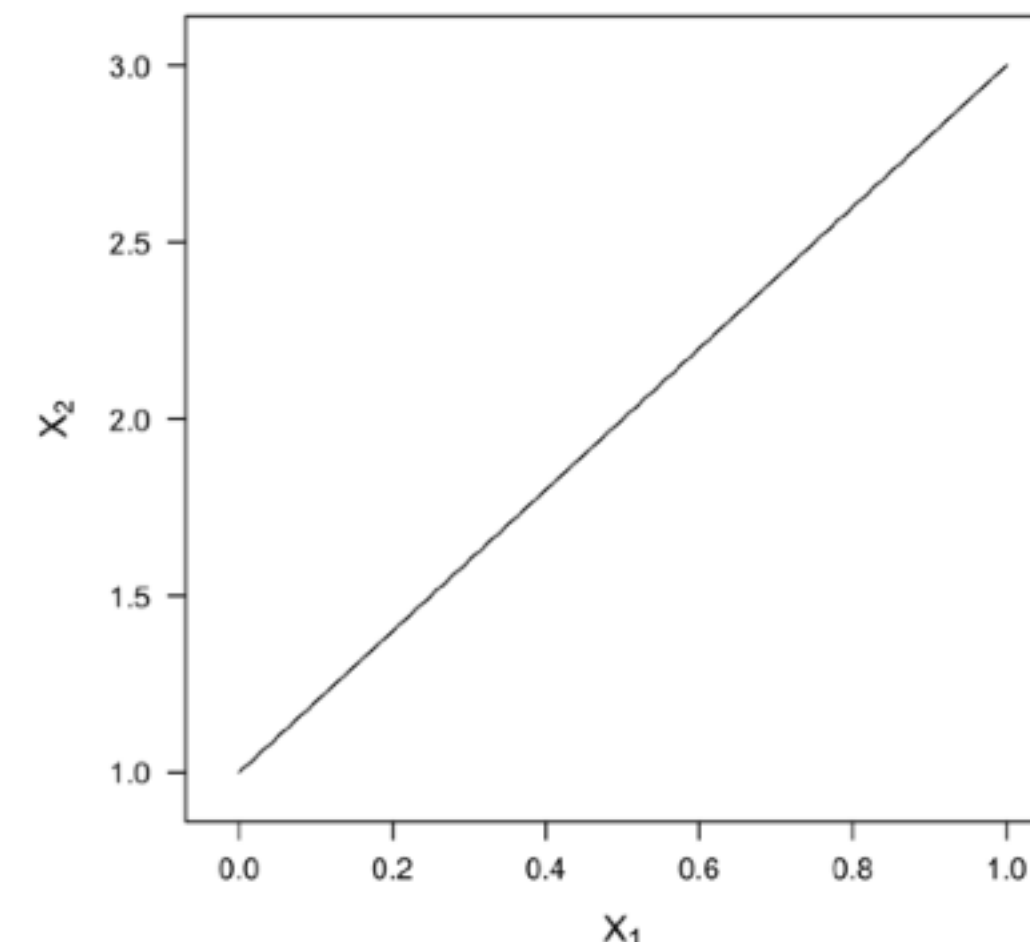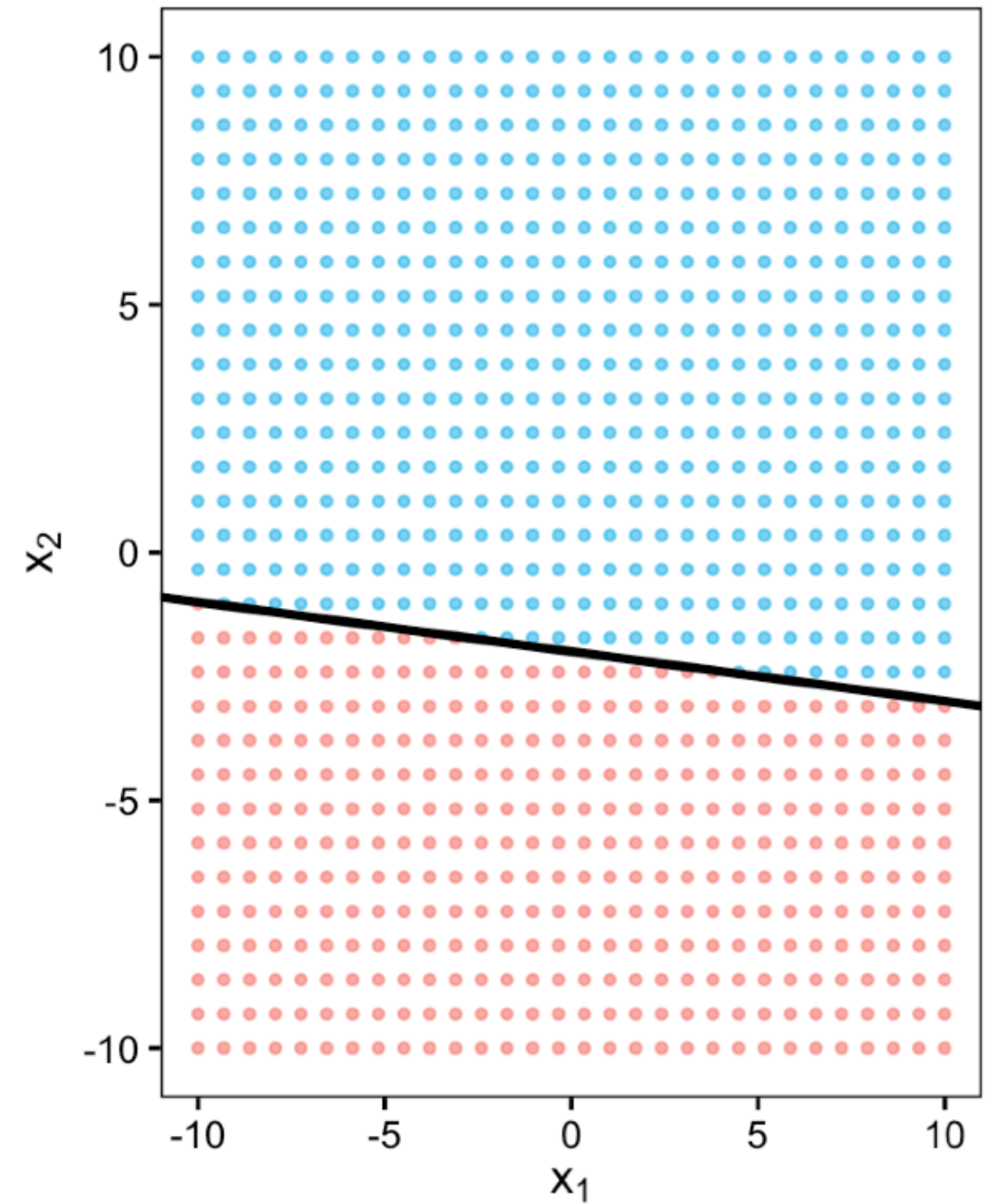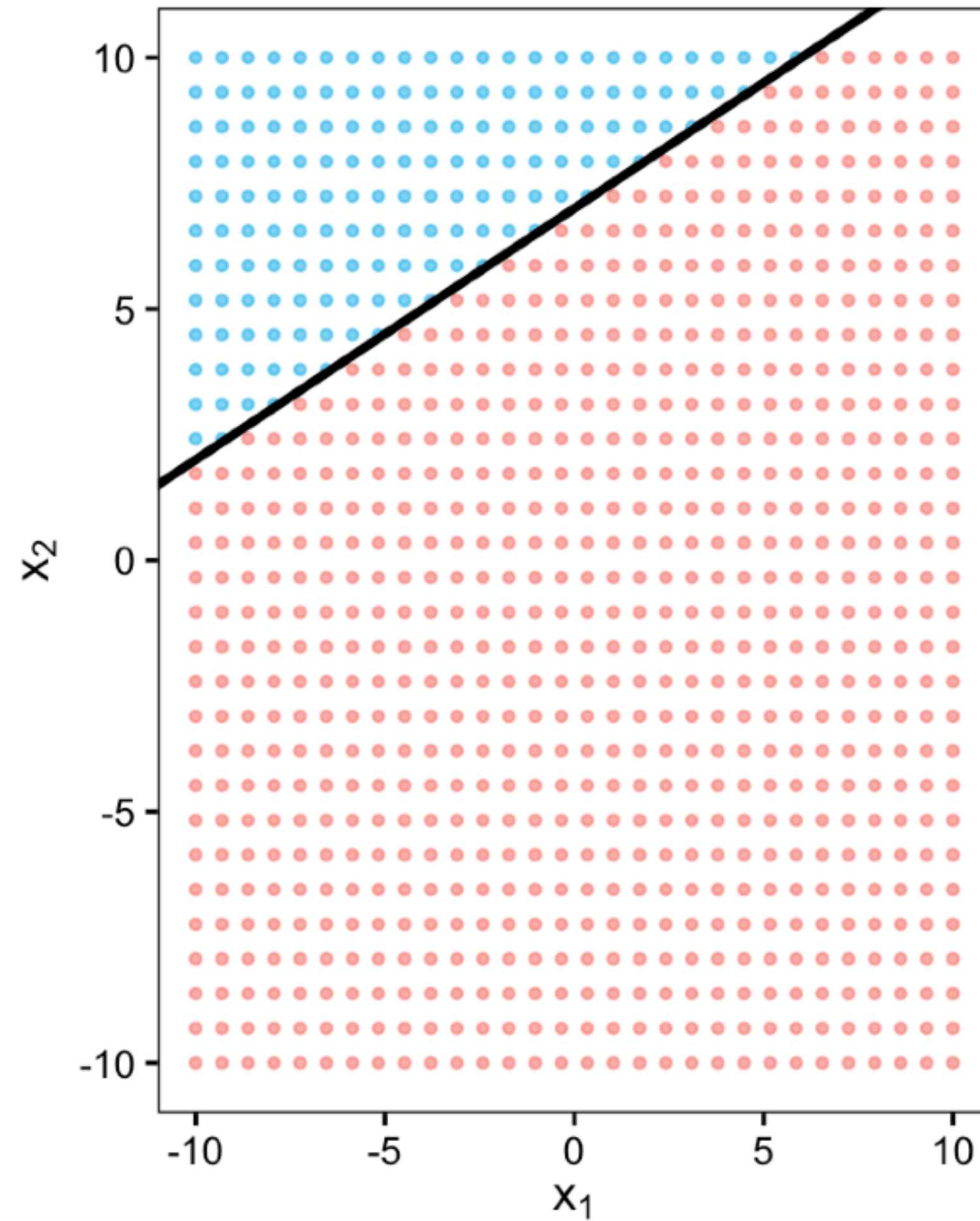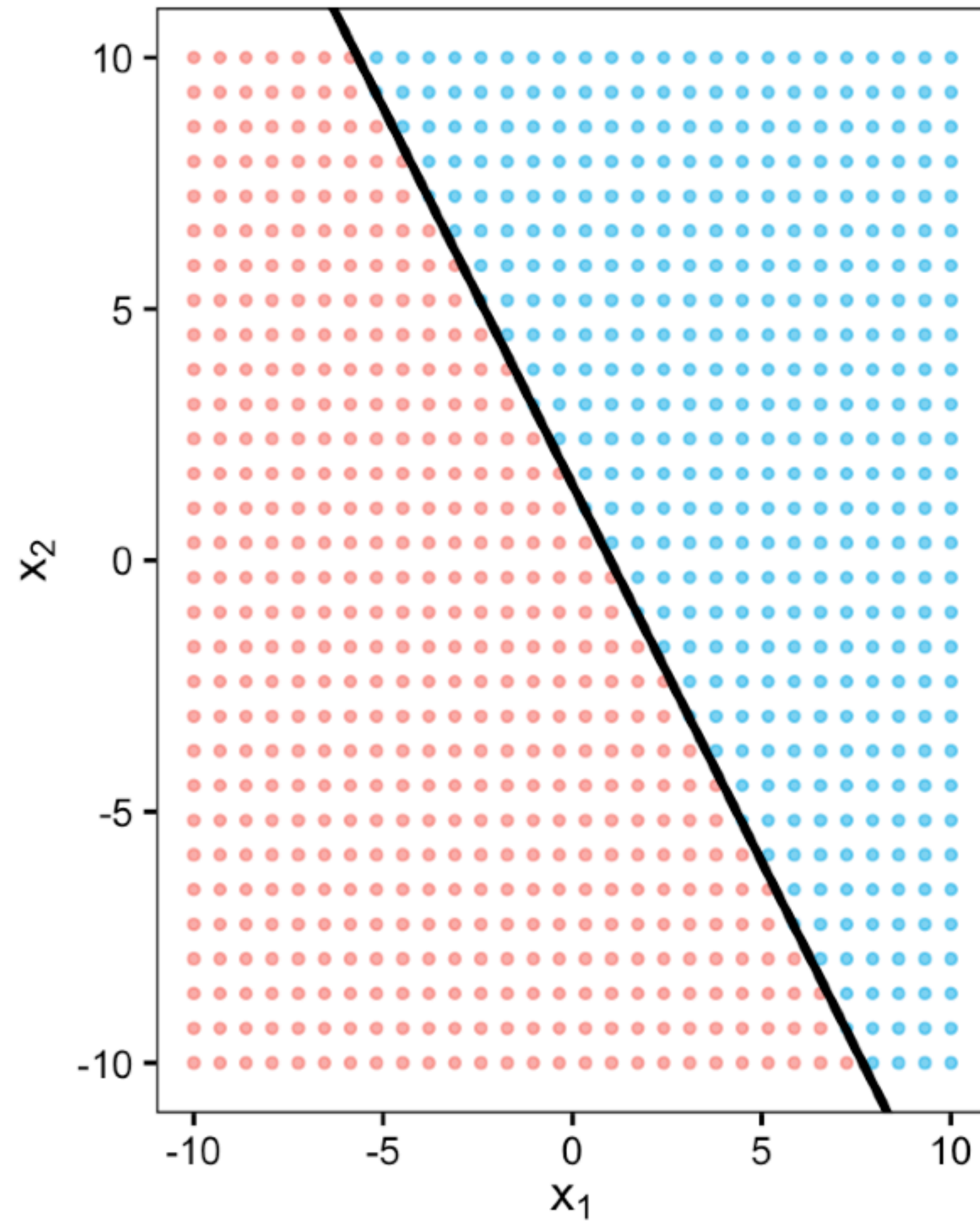# Hyperplanes

"a flat affine subspace" 😐

- **Flat:**
  - hyperplane is not curved, it increases/decreases constantly in each direction

- **Affine:**
  - the hyperplane doesn't need to pass through the origin
  - it can have an "offset" or be shifted (may have intercept)

- **Subspace:**
  - a subset of vectors in a larger vector space
  - in a $d-$dimensional space, a hyperplane has dimension $d-1$
  - in 2D it is a **line**, in 3D it is a **plane**
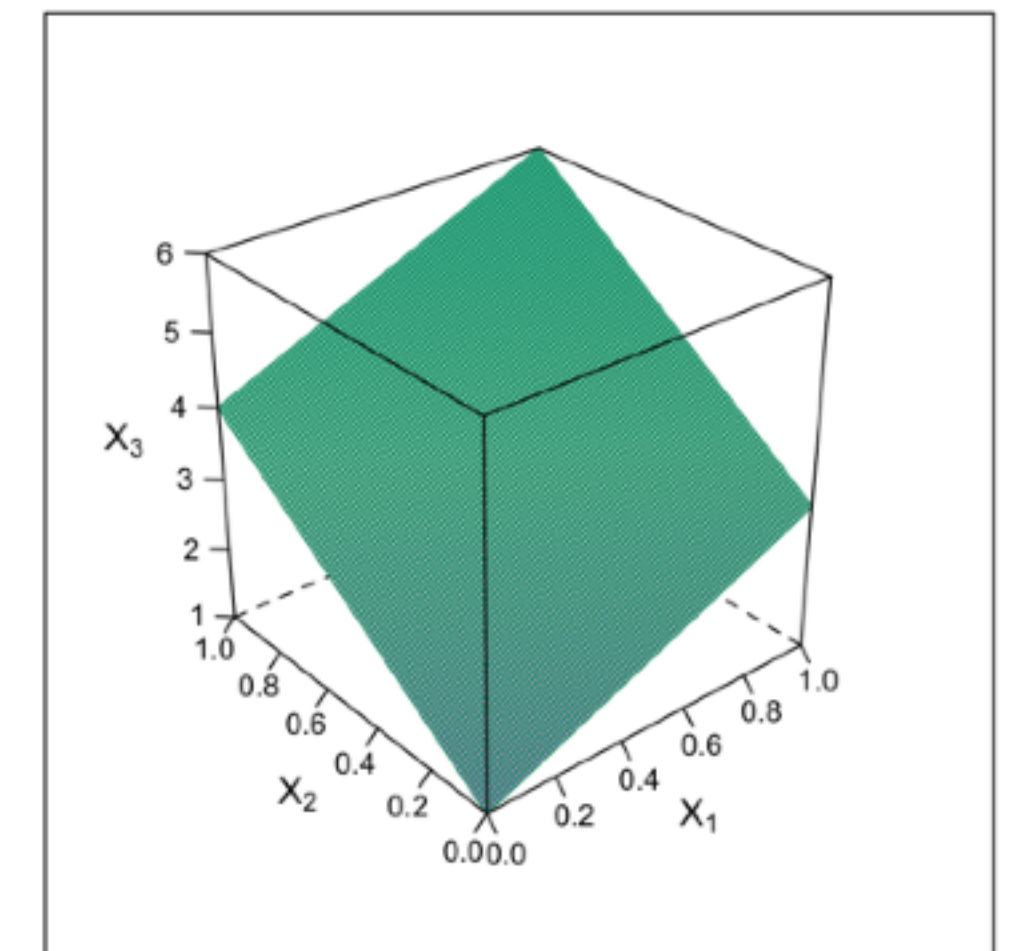
Hyperplanes Divide the Space in Half

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