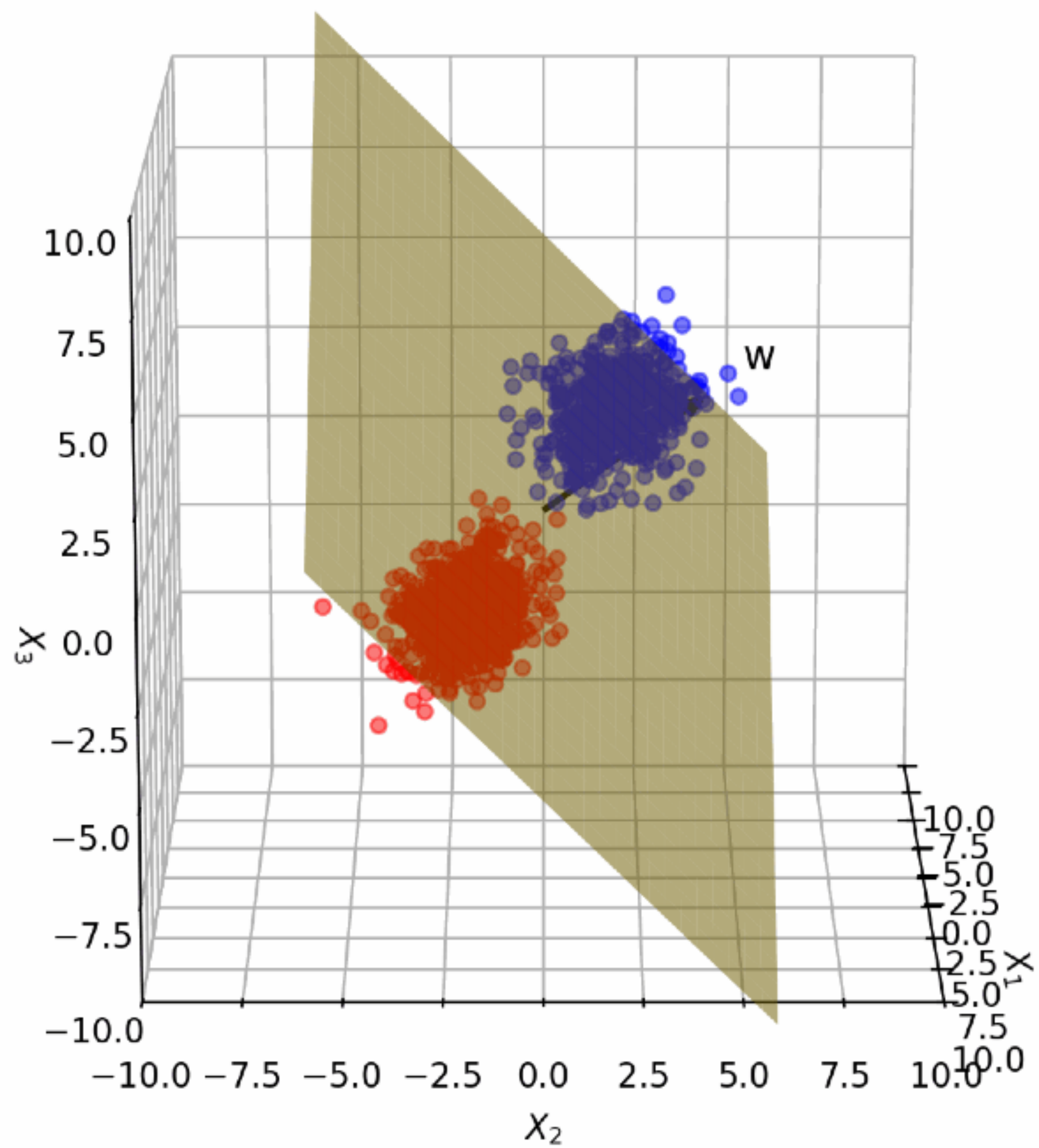
INSEA


w
X_1
X_2
X_3

17

Et si on utilise trois variables:

$$g(\mathbf{x}) = \alpha + \beta_1 \mathbf{x}^1 + \beta_2 \mathbf{x}^2 + \beta_3 \mathbf{x}^3$$

$$g(\mathbf{x}) = \alpha + \beta^\top \mathbf{x}$$

Que forment les $\mathbf{x}$ tels que $\{g(\mathbf{x}) = 0\}$?

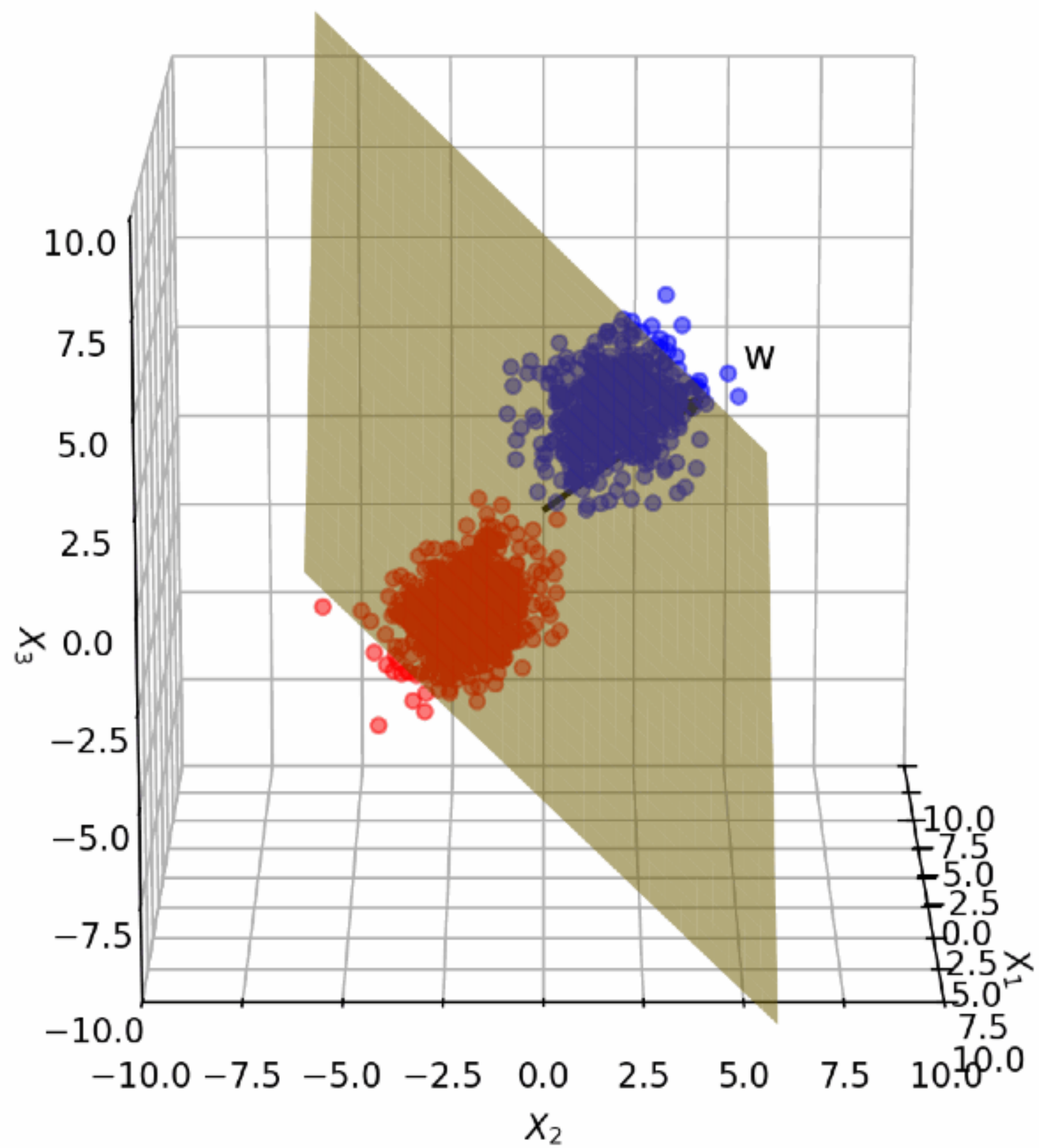
En dimension d: $g(\mathbf{x}) = \alpha + \beta^\top \mathbf{x}, \quad \beta \in \mathbb{R}^d$

Que forment les $\mathbf{x}$ tels que $\{g(\mathbf{x}) = 0\}$?

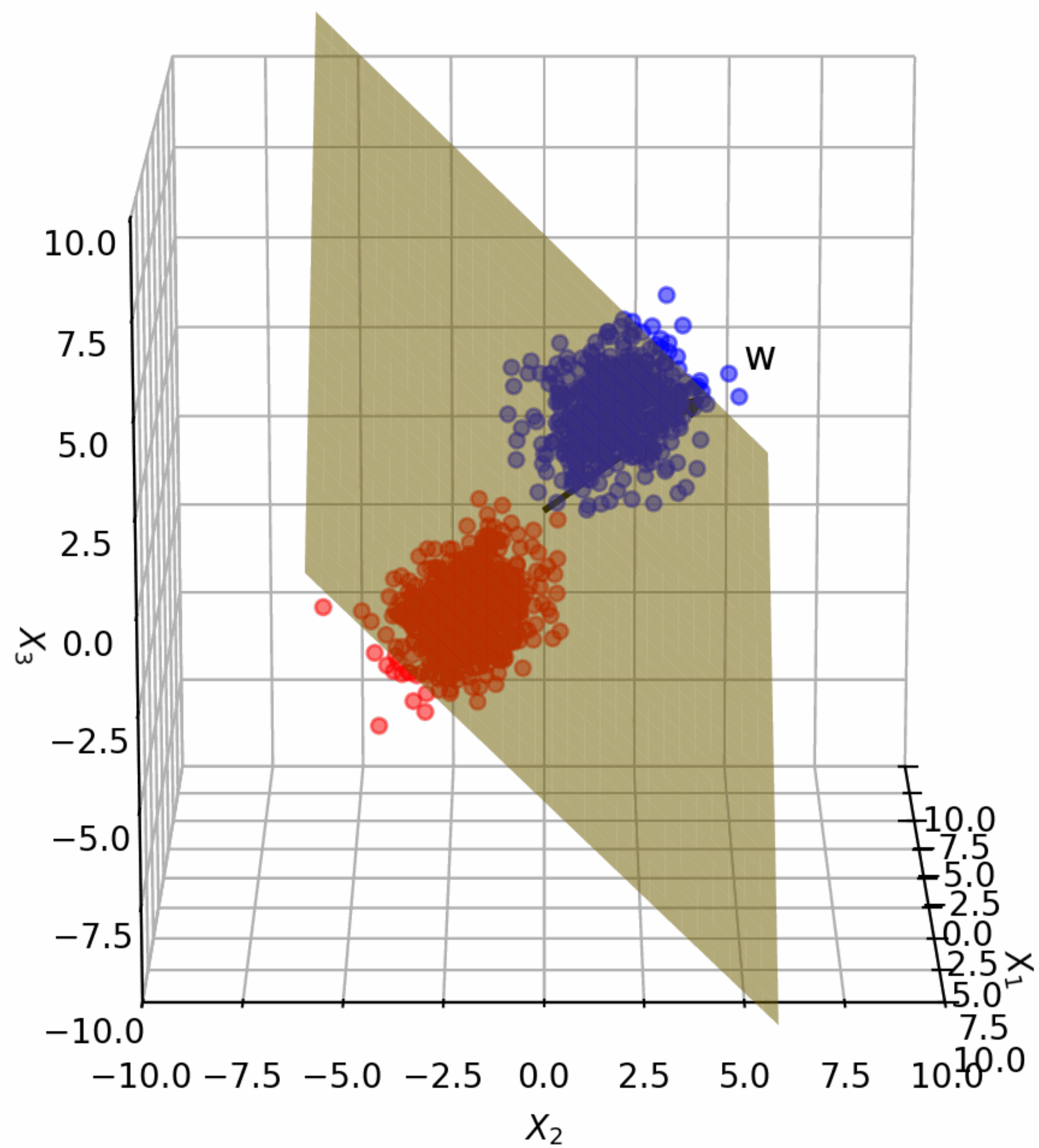
Un espace de dimension d-1: un hyperplan

séparateur linéaire en dimension d

Machine learning classique: zero-to-hero



w
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
X_3
−10.0 −7.5 −5.0 −2.5 0.0 2.5 5.0 7.5 10.0
X_2
10.0
7.5
5.0
2.5
0.0
2.5
5.0
7.5
10.0
X_1



w
X_1
X_2
X_3

Et si on utilise trois variables:

$$g(\mathbf{x}) = \alpha + \beta_1 \mathbf{x}^1 + \beta_2 \mathbf{x}^2 + \beta_3 \mathbf{x}^3$$

$$g(\mathbf{x}) = \alpha + \beta^\top \mathbf{x}$$

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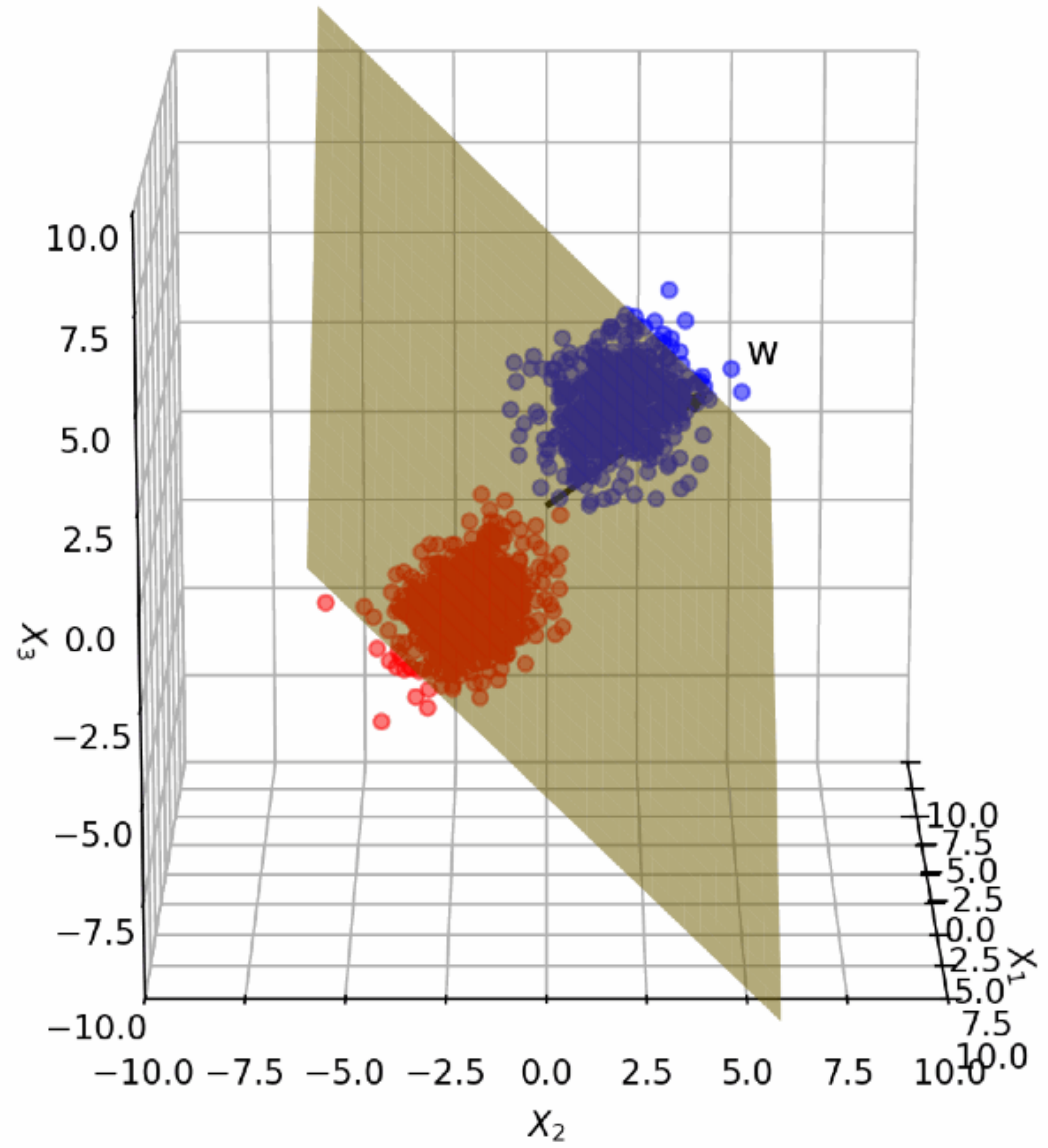

En dimension d: $g(\mathbf{x}) = \alpha + \beta^\top \mathbf{x}, \quad \beta \in \mathbb{R}^d$

Que forment les $\mathbf{x}$ tels que $\{g(\mathbf{x}) = 0\}$?

Un espace de dimension d-1: un hyperplan

$$\min_{\alpha \in \mathbb{R}, \beta \in \mathbb{R}^d} \sum_{i=1}^{n} (\mathbb{1}_{\{\alpha + \beta^\top \mathbf{x}_i \geq 0\}} - y_i)^2$$

Fonction non différentiable (discontinue même) difficile à optimiser