Probabilistic Constraints $C - SVC$: TP1

Let (X_i, y_i), $i = 1, \ldots, n$ such that: $n \in \{20, 50, 100\}$

- $X_i = (X_i^1, X_i^2)^T$, $i = 1, \ldots, n$:

- $y_i = \begin{cases} 1 & i = 1, \ldots, m \\ -1 & i = m + 1, \ldots, n \end{cases}$

- For $i = 1, \ldots, m$, you randomply generate $n_i = 30$ samples for any of

  - $X_i^1 \rightsquigarrow \mathcal{N}(\mu = 5, \sigma = 2)$

  - $X_i^2 \rightsquigarrow \mathcal{N}(\mu = 3, \sigma = 1)$

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  - $X_i^2 \rightsquigarrow \mathcal{N}(\mu = 2, \sigma)$

- Compute $\bar{x}_i = \left(\frac{1}{n_i} \sum_{k=1}^{n_i} x_{ik}^1, \frac{1}{n_i} \sum_{k=1}^{n_i} x_{ik}^2 \right)^T = (\bar{x}_i^1, \bar{x}_i^2)^T$,

- Consider $a = 2, p_i = 0{,}9$ and you choose appropriate $C \in \{5, 20, 50, 100, 150, 200, 250, 300\}$

- Solve the optimization problem $(D - SVC$ or $C - SVC)$ and contruit :

  the separating hyperplane $h_{w^*, b^*}(x) = (w^*)^T x + b^*$