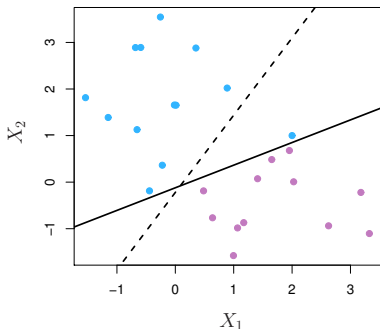
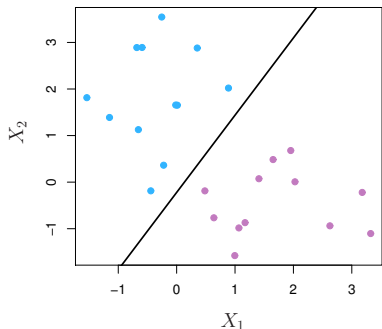
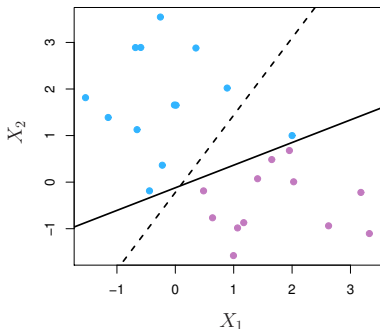
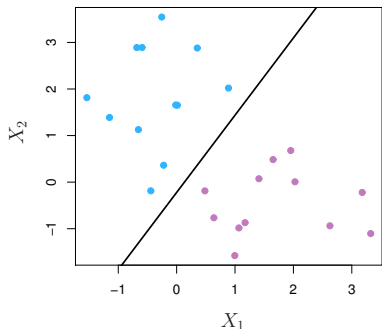


Noisy Data



Sometimes the data are separable, but noisy. This can lead to a poor solution for the maximal-margin classifier.

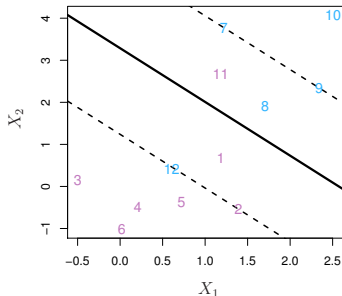
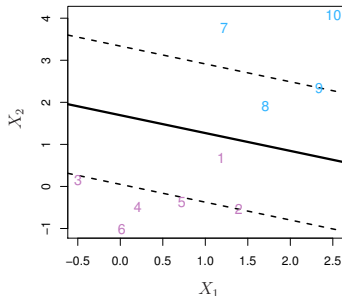
Noisy Data



Sometimes the data are separable, but noisy. This can lead to a poor solution for the maximal-margin classifier.

The *support vector classifier* maximizes a *soft* margin.

Support Vector Classifier



$$\begin{aligned} & \underset{\beta_0, \beta_1, \dots, \beta_p, \epsilon_1, \dots, \epsilon_n}{\text{maximize}} && M \quad \text{subject to} \quad \sum_{j=1}^p \beta_j^2 = 1, \\ & y_i(\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}) \geq M(1 - \epsilon_i), \\ & \epsilon_i \geq 0, \quad \sum_{i=1}^n \epsilon_i \leq C, \end{aligned}$$

C is a regularization parameter

