

**Exercise 1:**

Consider a case of binary classification, i.e.,  $y \in \{0, 1\}$ , where you only have a one-dimensional feature  $\mathbf{x}$ .

- (a) Derive the decision regions for LDA, i.e., assuming that  $\mathbf{x}|y = k \sim \mathcal{N}(\mu_k, \sigma^2)$  for  $k \in \{0, 1\}$
- (b) Derive the decision regions for QDA, i.e., assuming that  $\mathbf{x}|y = k \sim \mathcal{N}(\mu_k, \sigma_k^2)$  for  $k \in \{0, 1\}$

*Hint:* In both parts, start with  $p(\mathbf{x}|y = 0) = p(\mathbf{x}|y = 1)$  and solve for  $\mathbf{x}$ .