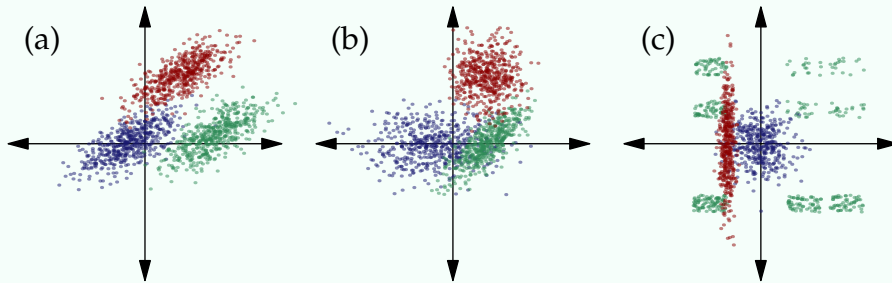


**Problem 1**

Suppose that  $f_1, f_2$  are distinct normal densities and  $p \in (0, 1)$ . Is  $x \mapsto pf_1(x) + (1 - p)f_2(x)$  a normal density?

**Problem 2**

Match each data set with the best-suited model: Naive Bayes, LDA, QDA.



**Problem 3**

Consider the problem of classifying a US man or woman as a man or a woman based on their height. Suppose that the distribution of heights among women is normal with mean 63.7 inches and standard deviation 2.7 inches, and that the distribution of heights among men is normal with a mean of 69.1 inches and a standard deviation of 2.9 inches. The proportion of men or women in the US who are women is 50.8%, and the proportion of men is 49.2%.

- (a) Based on the model specified above, is the distribution of heights among all men and women normal?
- (b) Find the Bayes classifier for this example (the classifier with minimal error rate).
- (c) What is the misclassification probability for the Bayes classifier?