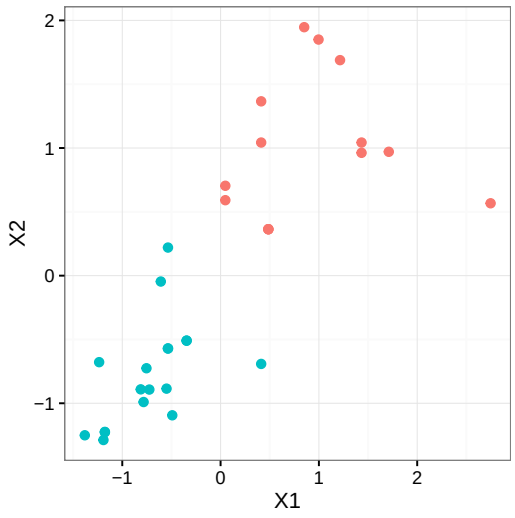
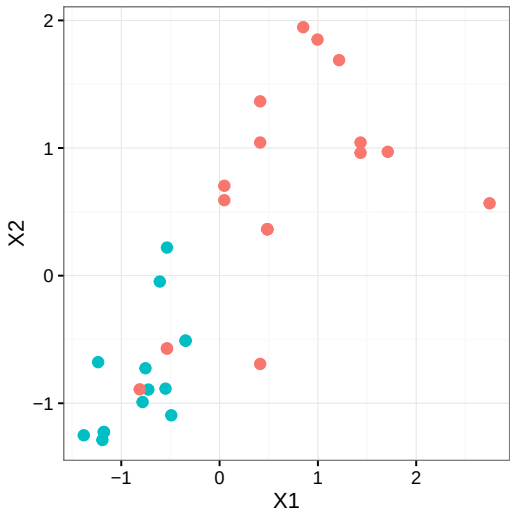
Separating planes

The two scatterplots below represent two training data sets where there are two predictors, X_1 and X_2, and a two class response, $Y \in \{\text{red}, \text{blue}\}$. Use a straight edge to draw a decision boundary that you expect to minimize the testing misclassification rate. Below each image write down the formal geometric *rule* that you used to construct a decision boundary between the two classes.



Rule:



Rule:

Now let's relax the constraint that the decision boundary is linear. For both plots above, draw a revised dashed line that can be curved if you think that would be benefitial. It's difficult to formalize a geometric rule for a hand-drawn curve, but what general principles did you use when deciding on your new boundaries?