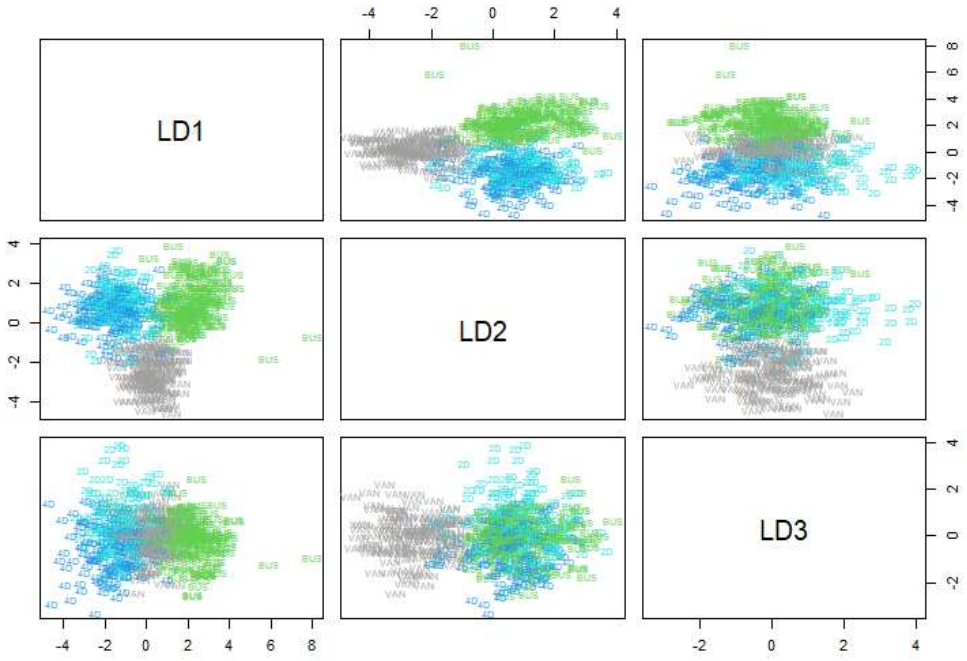
3. Run LDA on these data.
(a) Make a colour plot of the classes against pairs of linear discriminants. The plot() function will do this for you automatically. Use these colours:
class.col <- ifelse(set1$class==1,y=53,n= ifelse(set1$class==2,y=68,n= ifelse(set1$class==3,y=203,n=464)))
**Present the plot and write a sentence for each linear discriminant, explaining how it seems to separate classes.**

```
134 ##### 3. Run LDA on these data.
135 # (a) Make a colour plot of the classes against pairs of linear discriminants
136 scale.1 <- function(x1,x2){
137   for(col in 1:ncol(x1)){
138     a <- mean(x2[,col])
139     b <- sd(x2[,col])
140     x1[,col] <- (x1[,col]-a)/b
141   }
142   x1
143 }
144
145
146 X.train.DA = scale.1(set1[,-19], set1[,-19])
147 X.valid.DA = scale.1(set2[,-19], set1[,-19])
148
149 ### Fit an LDA model using the lda() funtion from the MASS package. This
150 ### function uses predictor/response syntax.
151 class.col <- ifelse(set1$class==1,y=53,n= ifelse(set1$class==2,y=68,n=
152                                                  ifelse(set1$class==3,y=203,n=464)))
153 fit.lda = lda(X.train.DA, Y.train)
154
155 plot(fit.lda, col = class.col)
156
157
```




-> It looks like LDA discriminates 3 classes quite well. Some of them are separated horizontally and some of them are separated vertically and so on.

(b) **Report training and test error**. **How does test error compare to other methods?**

```
158  pred.lda = predict(fit.lda, X.valid.DA)$class
159
160  table(Y.valid, pred.lda, dnn = c("Obs", "Pred"))
161
162  (miss.lda = mean(Y.valid != pred.lda))
```

```
> (miss.lda = mean(Y.valid != pred.lda))
[1] 0.1981132
```

So far this shows the best performance.

4. Run QDA on these data. **Report training and test error**. **How does test error compare to other methods?**

```
# 4. Run QDA on these data. Report training and test error. How does test error
# compare to other methods?
fit.qda = qda(X.train.DA, Y.train)

pred.qda = predict(fit.qda, X.valid.DA)$class

table(Y.valid, pred.qda, dnn = c("Obs", "Pred"))
(miss.qda = mean(Y.valid != pred.qda))
```

```
> (miss.qda = mean(Y.valid != pred.qda))
[1] 0.1698113
```

This shows better performance even than LDA. This is due to the fact that quadratic have less bias than linear.