

1. Load the iris dataset and read the help file with

```
data(iris)
?iris
```

- (a) Write a function using the EM algorithm to fit a Multivariate Normal mixture distribution. Minimally, it should assume 3 components. Do not assume that the component distributions all have the same covariance matrix; you will need to produce weighted estimates of the means and covariance matrices for each component. The following help file may be worth reading:

```
?cov.wt
```

You will need the density function for the Multivariate Normal, which you can load with the mvtnorm library:

```
install.packages("mvtnorm") # just the first time
library(mvtnorm)
?dmvnorm
```

Your function should return a list with the parameter estimates for the three components and a matrix with case weights for each of the components (i.e. probability that case  $i$  belongs to group  $j$ ).

- (b) Use your function to fit a 3 component mixture distribution to the iris data.
- (c) Compare the group assignment probabilities to the actual species.