Problem 2

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```
library(fpc)
data(wine, package="rattle")
wein <- wine[-1]
wein$cat <- integer(length(wein[,1]))
central <- wein[sample(1:178,3),]
zentrum <- matrix(NA, ncol=14, nrow=3)
for(zeit in 1:100){
  for(i in 1:length(wein[,1])){
    d1 <- dist(rbind(wein[i,-14],central[1,-14]))
    d2 <- dist(rbind(wein[i,-14],central[2,-14]))
    d3 <- dist(rbind(wein[i,-14],central[3,-14]))
    wein$cat[i] <- as.integer(which.min(c(d1,d2,d3)))
  }
  dist <- numeric(3)
  for(j in 1:3){
    zentrum[j,] <- as.numeric(central[j,])
    central[j,] <- colMeans(wein[which(wein$cat==j),])
    dist[j] <- dist(rbind(zentrum[j,],central[j,]))
  }
  if(max(dist) < 0.1) break
}
plotcluster(wein[-14], wein$cat)
```