```
# d)
euro  = read.table(file = "Europe.txt", header = T, dec =".")
attach(euro)
europe = data.frame(euro)
europe = na.omit(europe)
Country = ï..Country
numbers = cbind(CPI, UNE, INP, BOP, PRC, UN)
S = cov(numbers)

R = cor(numbers)

Ehat = eigen(R)$vectors
Lamhat = eigen(R)$values
Lam = diag(x = c(Lamhat),nrow = 6, ncol = 6)
round(Lam, digits = 4)

##        [,1]   [,2]   [,3]   [,4]   [,5]  [,6]
## [1,] 2.2648 0.0000 0.0000 0.0000 0.0000 0.000
## [2,] 0.0000 1.5357 0.0000 0.0000 0.0000 0.000
## [3,] 0.0000 0.0000 0.9192 0.0000 0.0000 0.000
## [4,] 0.0000 0.0000 0.0000 0.7077 0.0000 0.000
## [5,] 0.0000 0.0000 0.0000 0.0000 0.4418 0.000
## [6,] 0.0000 0.0000 0.0000 0.0000 0.0000 0.131

Lamhatsqu = sqrt(Lam)
round(Lamhatsqu, digits = 4)

##        [,1]   [,2]   [,3]   [,4]   [,5]   [,6]
## [1,] 1.5049 0.0000 0.0000 0.0000 0.0000 0.0000
## [2,] 0.0000 1.2392 0.0000 0.0000 0.0000 0.0000
## [3,] 0.0000 0.0000 0.9587 0.0000 0.0000 0.0000
## [4,] 0.0000 0.0000 0.0000 0.8412 0.0000 0.0000
## [5,] 0.0000 0.0000 0.0000 0.0000 0.6647 0.0000
## [6,] 0.0000 0.0000 0.0000 0.0000 0.0000 0.3619

ltil = Ehat%*%Lamhatsqu
Ltil = round(ltil, digits = 4)

c = diag(1-((Ltil[,1])^2+(Ltil[,2])^2),6,6)
round(R-Ltil[,1:2]%*%t(Ltil[,1:2])-c, digits = 4)

##         CPI     UNE     INP     BOP     PRC      UN
## CPI  0.0000 -0.0534 -0.2626  0.1823  0.0414  0.0442
## UNE -0.0534  0.0000 -0.0733  0.1570  0.1280 -0.2820
## INP -0.2626 -0.0733  0.0000 -0.1256 -0.0054  0.2085
## BOP  0.1823  0.1570 -0.1256  0.0000 -0.0023  0.1298
## PRC  0.0414  0.1280 -0.0054 -0.0023  0.0000 -0.0940
## UN   0.0442 -0.2820  0.2085  0.1298 -0.0940  0.0000
```