> #9-10

> L<-matrix(c(0.602, 0.2,

+ 0.467, 0.154,

+ 0.926, 0.143,

+ 1, 0,

+ 0.874, 0.476,

+ 0.894, 0.327),ncol=2,byrow = TRUE)

> cor<- matrix(c(1.0, 0.505, 0.569, 0.602, 0.621, 0.603,

+ 0.505, 1.0, 0.422, 0.467, 0.482, 0.450,

+ 0.569, 0.422, 1.0, 0.926, 0.877, 0.878,

+ 0.602, 0.467, 0.926, 1.0, 0.874, 0.894,

+ 0.621, 0.482, 0.877, 0.874, 1.0, 0.937,

+ 0.603, 0.450, 0.878, 0.894, 0.937, 1.0), ncol=6, byrow=TRUE)

> #a.

> LLt<- L%\*%t(L)

> LLt

[,1] [,2] [,3] [,4] [,5] [,6]

[1,] 0.402404 0.311934 0.586052 0.602 0.621348 0.603588

[2,] 0.311934 0.241805 0.454464 0.467 0.481462 0.467856

[3,] 0.586052 0.454464 0.877925 0.926 0.877392 0.874605

[4,] 0.602000 0.467000 0.926000 1.000 0.874000 0.894000

[5,] 0.621348 0.481462 0.877392 0.874 0.990452 0.937008

[6,] 0.603588 0.467856 0.874605 0.894 0.937008 0.906165

> kpsi<- cor-round(LLt,3)

> psi<-diag(6)\*diag(kpsi)

> psi

[,1] [,2] [,3] [,4] [,5] [,6]

[1,] 0.598 0.000 0.000 0 0.00 0.000

[2,] 0.000 0.758 0.000 0 0.00 0.000

[3,] 0.000 0.000 0.122 0 0.00 0.000

[4,] 0.000 0.000 0.000 0 0.00 0.000

[5,] 0.000 0.000 0.000 0 0.01 0.000

[6,] 0.000 0.000 0.000 0 0.00 0.094

> #d.

> cor-round(LLt,3)-psi

[,1] [,2] [,3] [,4] [,5] [,6]

[1,] 0.000 0.193 -0.017 0 0.000 -0.001

[2,] 0.193 0.000 -0.032 0 0.001 -0.018

[3,] -0.017 -0.032 0.000 0 0.000 0.003

[4,] 0.000 0.000 0.000 0 0.000 0.000

[5,] 0.000 0.001 0.000 0 0.000 0.000

[6,] -0.001 -0.018 0.003 0 0.000 0.000

> #10-10

> X<-matrix(c(1.0,0.615,

+ 0.615,1.0), ncol=2, byrow=TRUE);X

[,1] [,2]

[1,] 1.000 0.615

[2,] 0.615 1.000

> Y<-matrix(c(1.0,-0.269,

+ -0.269,1.0), ncol=2, byrow=TRUE);Y

[,1] [,2]

[1,] 1.000 -0.269

[2,] -0.269 1.000

> XY<-matrix(c(-0.111,-0.266,

+ -0.195,-0.085),ncol=2, byrow=TRUE);XY

[,1] [,2]

[1,] -0.111 -0.266

[2,] -0.195 -0.085

> matrix(c(1.0,0.615,-0.111,-0.266,

+ 0.615,1.0,-0.195,-0.085,

+ -0.111,-0.195,1.0,-0.269,

+ -0.266,-0.085,-0.269,1.0), ncol=4, byrow=TRUE)

[,1] [,2] [,3] [,4]

[1,] 1.000 0.615 -0.111 -0.266

[2,] 0.615 1.000 -0.195 -0.085

[3,] -0.111 -0.195 1.000 -0.269

[4,] -0.266 -0.085 -0.269 1.000

> Sx <- X

> Sy <- Y

> Sxy <- XY

> (Sxeig <- eigen(Sx, symmetric=TRUE))

eigen() decomposition

$values

[1] 1.615 0.385

$vectors

[,1] [,2]

[1,] 0.7071068 -0.7071068

[2,] 0.7071068 0.7071068

> (Sxisqrt <- Sxeig$vectors %\*% diag(1/sqrt(Sxeig$values)) %\*% t(Sxeig$vectors))

[,1] [,2]

[1,] 1.1992677 -0.4123782

[2,] -0.4123782 1.1992677

> (Syeig <- eigen(Sy, symmetric=TRUE))

eigen() decomposition

$values

[1] 1.269 0.731

$vectors

[,1] [,2]

[1,] -0.7071068 -0.7071068

[2,] 0.7071068 -0.7071068

> (Syisqrt <- Syeig$vectors %\*% diag(1/sqrt(Syeig$values)) %\*% t(Syeig$vectors))

[,1] [,2]

[1,] 1.0286584 0.1409523

[2,] 0.1409523 1.0286584

> (Xmat <- Sxisqrt %\*% Sxy %\*% solve(Sy) %\*% t(Sxy) %\*% Sxisqrt)

[,1] [,2]

[1,] 0.09859301 0.02368097

[2,] 0.02368097 0.03735368

> (Ymat <- Syisqrt %\*% t(Sxy) %\*% solve(Sx) %\*% Sxy %\*% Syisqrt)

[,1] [,2]

[1,] 0.04589122 0.03179201

[2,] 0.03179201 0.09005547

> (Xeig <- eigen(Xmat, symmetric=TRUE))

eigen() decomposition

$values

[1] 0.10668190 0.02926479

$vectors

[,1] [,2]

[1,] -0.9463168 0.3232407

[2,] -0.3232407 -0.9463168

> (Yeig <- eigen(Ymat, symmetric=TRUE))

eigen() decomposition

$values

[1] 0.10668190 0.02926479

$vectors

[,1] [,2]

[1,] 0.4634266 -0.8861353

[2,] 0.8861353 0.4634266

> rho <- sqrt(Xeig$values)

> rho

[1] 0.3266219 0.1710696

> a<-Sxisqrt%\*%Xeig$vectors

> b<-Syisqrt%\*%Yeig$vectors

> a

[,1] [,2]

[1,] -1.001589761 0.7778925

[2,] 0.002588365 -1.2681846

> b

[,1] [,2]

[1,] 0.6016105 -0.8462094

[2,] 0.9768515 0.3518049