STAT 802 Applied Multivariate Analysis Oct 12, 2005

Today: Asst 3 feedback
More Ch 8 Principal Components.

Feedback from Assignment 3 (ex 5.9 + power ex)

5.9 a) and b) large sample is chi sq, small sample is T^2

5.9 d) "using m=6" why?

power ex means *and* corr relationship: neg corr -> if means increase together, they are in direction of minor axis, so power increases faster as means leave 0 (in dir of major axis)

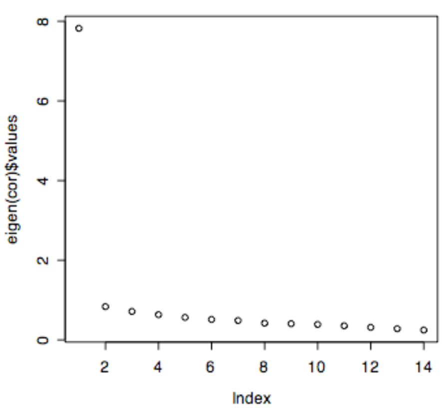
programs for ellipses. corr=0 picture expanded by evs, euclid distance, project for coords, and shift for means.

Ch 8:

p 435 comment re sigma vs rho

p 436 eqi-correlation pattern: try

```
a=mat.ex(n=100,p=14,corr=.5)
data=a[[1]]
cor=cor(data)
plot(eigen(cor)$values)
```



Note connection with "scree test".

Proportion or variance explained by first component is $\rho + (1-\rho)/p = .5 + .5/14 = 0.54$

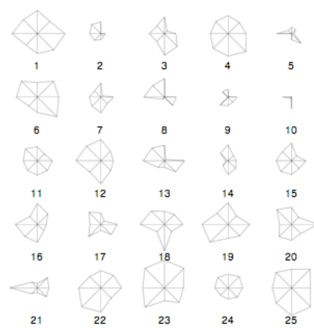
p 438 sample principal components (scalars) $\hat{y}_i$ = calculable from length of projection of observation x on ith eigenvector (inner product gives the scalar). variance of all these ith components is λ_ι and cor between ith component and x is .... see bottom p 438.

Note implications for interpretation of the component. Ex 8.3 p 439.

What flexibility is there in the signs of entries in a covariance matrix?

Star plots options.

```
a=mat.ex(p=8)
stars(a[[1]])
```



Calculating Principal Components and checking variances

```
a=mat.ex(p=8)
data=a[[1]]
eigen=eigen(cov(data))
pcs=data%*%eigen$vectors
var(pcs[,1])
[1] 3.585215
eigen$values[1]
[1] 3.585215
```

Exercise for Wed Oct 19 8.6 and 8.7 page 467 Optional.