library(MASS)

xy<-mvrnorm(1000,mu=c(50,60),matrix(c(4,3.7,3.7,9),2))

var(xy)

xy<-mvrnorm(10000,mu=c(50,60),matrix(c(4,3.7,3.7,9),2))

var(xy)

cor(xy)

v=matrix(c(4,3.7,3.7,9),2)

v

w=chol(v)

t(w)%\*%w

z1=rnorm(10000)

z2=rnorm(10000)

zm=matrix(c(z1,z2),ncol=2)

zn=zm%\*%w

var(zn);v

plot(zn)

points(zm,col='red')

Y = a + b X + epsilon

N <- 1000

a <- 1

b <- -1

Z <- rnorm(N)

epsilon <- rnorm(N)

eta <- rnorm(N)

aa <- runif(1)

bb <- runif(1)

X <- (aa + bb \* Z + epsilon) + eta

Y <- a + b \* X + epsilon

plot(X,Y)

abline(a,b, lty=2, lwd=3)

abline(lm(Y~X), col="red", lwd=3)