Simulation of AR(2) process

xxAt l n5L|(t-1)+phi2*x_(t-2)+z_t z_t~ N(0, sigma^2)

set seed a common number, so we can reproduce the same datasets

In [ ]:
```
set.seed(2017)
```

model parameters (we will estimate them)

In [ ]:
```
sigma=4
phi=NULL
phi[1:2]=c(1/3,1/2)
phi
```

number of data points

In [ ]:
```
n=10000
```

simulate ar process

In [ ]:
```
ar.process=arima.sim(n,model=list(ar=c(1/3,1/2)), sd=4)
ar.process[1:5]
```

find and name 2nd and 3rd sample autocorrelation

In [ ]:
```
r=NULL
r[1:2]=acf(ar.process, plot=F)$acf[2:3]
r
```

matrix R

In [ ]:
```
R=matrix(1,2,2) # matrix of dimension 2 by 2, with entries all 1's.
R
```

edit R

In [ ]:
```
R[1,2]=r[1] # only diagonal entries are edited
R[2,1]=r[1] # only diagonal entries are edited
R
```

b-column vector on the right

In [ ]:
```
b=matrix(r,nrow=2,ncol=1)# b- column vector with no entries
b
```

solve(R,b) solves Rx=b, and gives x=R^(-1)b vector

In [ ]:
```
phi.hat=matrix(c(solve(R,b)[1,1], solve(R,b)[2,1]),2,1)
phi.hat
```

variance estimation

In [ ]:
```
c0=acf(ar.process, type='covariance', plot=F)$acf[1]
var.hat=c0*(1-sum(phi.hat*r))
var.hat
```

plot time series, along with acf, pacf

In [ ]:
```
par(mfrow=c(3,1))
plot(ar.process, main='Simulated AR(2)')
acf(ar.process, main='ACF')
pacf(ar.process, main='PACF')
```

In [ ]:
```

```