Estimation of model patrameters of an AR(3) simulation

In [ ]:
```
# x_t =phi 1*x_(t-1) +phi 2*  x_(t-2) +\phi _3*x_(t-3) +z_t
# z_t ~ N(0,  sigma^2)
```

In [ ]:
```
set.seed(2017)
sigma=4
phi=NULL
phi[1:3]=c(1/3,1/2,7/100)
n=100000
```

Simulate AR(3) process

In [ ]:
```
ar3.process=arima.sim(n,model=list(ar=c(1/3,1/2, 7/100)), sd=4)
```

In [ ]:
```
r=NULL
r[1:3]=acf(ar3.process, plot=F)$acf[2:4]
r
```

In [ ]:
```
R=matrix(1,3,3)
R[1,2]=r[1]
R[1,3]=r[2]
R[2,1]=r[1]
R[2,3]=r[1]
R[3,1]=r[2]
R[3,2]=r[1]
R
```

In [ ]:
```
# b-colunm vector on the right
b=matrix(,3,1)# b- colunm vector with no entries
b[1,1]=r[1]
b[2,1]=r[2]
b[3,1]=r[3]
b
```

In [ ]:
```
# solve Rx=b and find phi's
phi.hat=solve(R,b)
phi.hat
```

In [ ]:
```
# sigme estimation
c0=acf(ar3.process, type='covariance', plot=F)$acf[1]
var.hat=c0*(1-sum(phi.hat*r))
var.hat
```

Plots

In [ ]:
```
par(mfrow=c(3,1))
plot(ar3.process, main='Simulated AR(3)')
acf(ar3.process, main='ACF')
pacf(ar3.process, main='PACF')
```

In [ ]:
```

```