Practice 12 R: ARFIMA models

First of all we can simulate an ARFIMA model:

```
n<-1000
x<-arima.sim(n, model=list(phi=c(0.2,0.1),
dfrac=0.4,theta=0.9))
plot(x, type="l")
```

Now fit the best model:

```
install.packages("fracdiff")
library(fracdiff)
fit1<-fracdiff(x, nar=2, nma=1, drange=c(0,0.5))
summary(fit1)
d<-fit1$d
fit2=diffseries(x,d)
acf(fit2)
fit3<-arima(fit2,order=c(2,0,1))
fit4<-resid(fit3)
acf(fit4)
Box.test(fit4, lag=log(n), type=c("Ljung-Box"))
```

Note that fit4 is an IID noise

But in fact, note that the estimation is not good, the estimated d is far from 0.4.

Change diferent vàlues for d, phi, theta, n....

Another exemple:

```
library(fracdiff)
n<-1000
sample<-fracdiff.sim(n, ar=0.9, d=0.4)
x<-sample$series
plot(x,type="l")
fit1<-fracdiff(x,nar=1)
summary(fit1)
d<-fit1$d
y1<-diffseries(x,d)
acf(y1)
y2<-arima(y1,order=c(1,0,0))
z<-resid(y2)
acf(z)
Box.test(z,log(n),type=c("Ljung-Box"))
```

For (1,d,0) models, this code is quite good, but if we change to an (0,d,1) things become worse. Try it.

Consider now the real series of quarterly data of Australian residents from 1972 to 1993 (88 data).

```
library(“datasets”)
x<-austres
acf(x)
dx<-diff(x)
acf(dx)
fdx<-fracdiff(dx,nar=0,nma=0, drange=c(0,0.5))
summary(fdx)
d=fdx$d
d
resid<-diffseries(dx,d)
y<-resid-mean(resid)
acf(y)
Box.test(y,lag=log(88),type=c("Ljung-Box"))
```