

Homework 7

Problem 25 b

LD recursions AR(1)

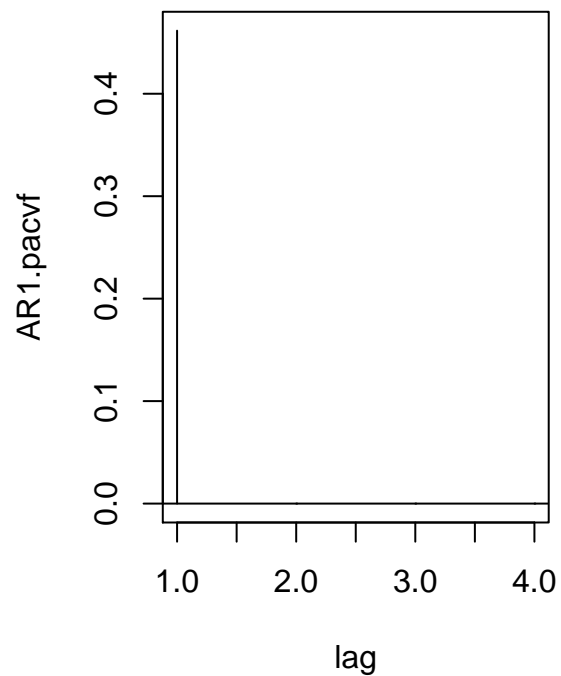
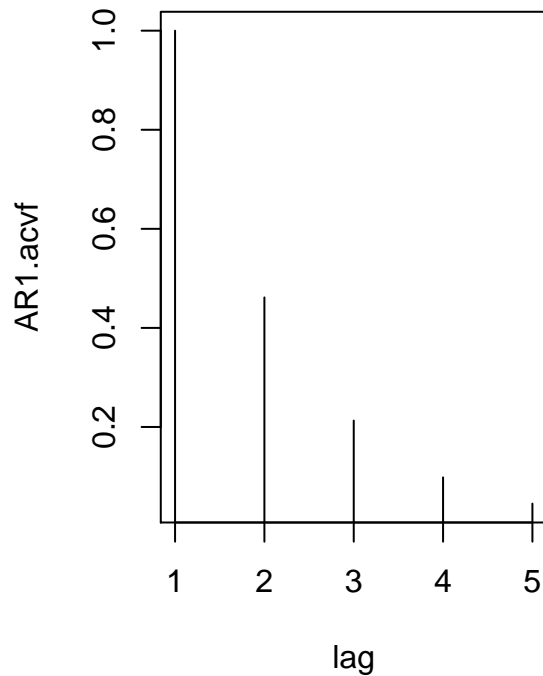
```
AR1.acvf <- as.vector(ARMAacf(ar=c(6/13),ma=0,lag=4))
AR1.pacvf <- as.vector(ARMAacf(ar=c(6/13),ma=0,lag=4,pacf = TRUE))

print('LD')
```

```
## [1] "LD"
```

```
print((results <- LD.recursions(AR1.acvf)))
```

```
## $coeffs
## [1] 4.615385e-01 7.053673e-17 0.000000e+00 0.000000e+00
##
## $innov.var
## [1] 0.7869822
##
## $pev
## [1] 1.0000000 0.7869822 0.7869822 0.7869822 0.7869822
##
## $pacf
## [1] 4.615385e-01 7.053673e-17 0.000000e+00 0.000000e+00
##
## $blpc
## $blpc[[1]]
## [1] 0.4615385
##
## $blpc[[2]]
## [1] 4.615385e-01 7.053673e-17
##
## $blpc[[3]]
## [1] 4.615385e-01 7.053673e-17 0.000000e+00
##
## $blpc[[4]]
## [1] 4.615385e-01 7.053673e-17 0.000000e+00 0.000000e+00
```



innovations ar(1)

```
print('innovations')
```

```
## [1] "innovations"
```

```
(results <- innovations.algorithm(AR1.acvf))
```

```
## $vs
```

```
## [1] 1.0000000 0.7869822 0.7869822 0.7869822 0.7869822
```

```
##
```

```
## $thetas
```

```
## $thetas[[1]]
```

```
## [1] 0.4615385
```

```
##
```

```
## $thetas[[2]]
```

```
## [1] 0.4615385 0.2130178
```

```
##
```

```
## $thetas[[3]]
```

```
## [1] 0.46153846 0.21301775 0.09831589
```

```
##
```

```
## $thetas[[4]]
```

```
## [1] 0.46153846 0.21301775 0.09831589 0.04537656
```

LD recursions MA(1)

```
ma1.acvf <- as.vector(ARMAacf(ma=c(2/3),lag=4))
```

```
ma1.pacf <- as.vector(ARMAacf(ma=c(2/3),lag=4,pacf = TRUE))
```

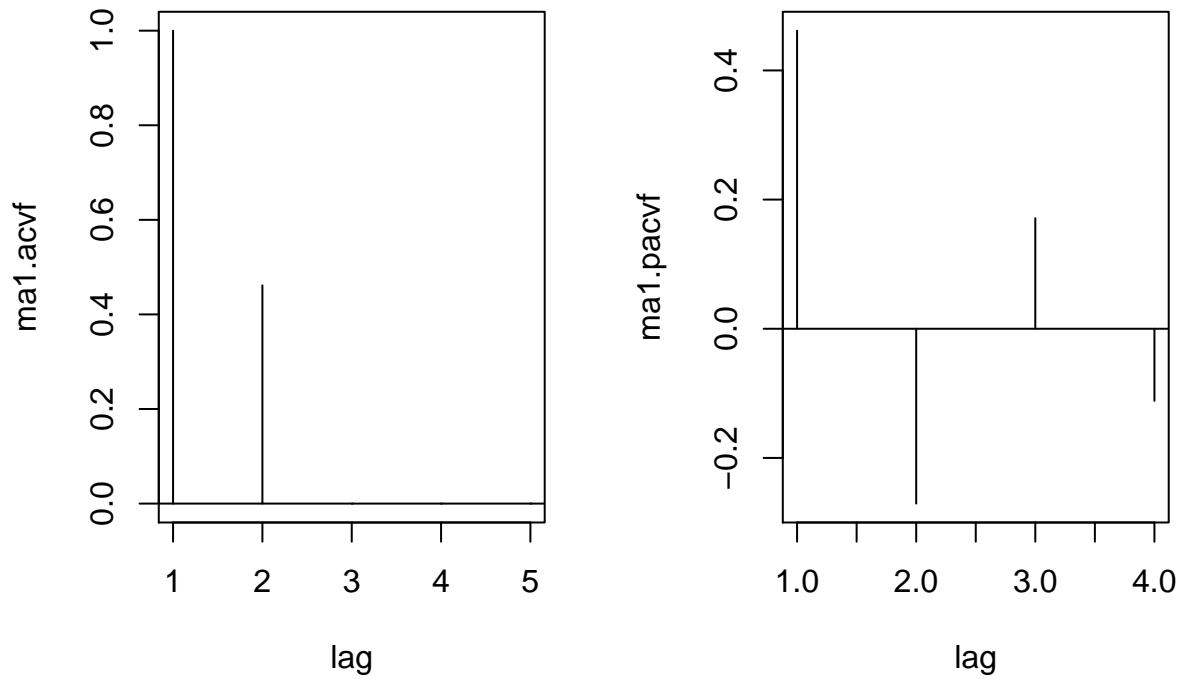
```
(results <- LD.recursions(ma1.acvf))
```

```
## $coeffs
## [1] 0.6519604 -0.4125808 0.2419647 -0.1116760
##
## $innov.var
## [1] 0.6990952
##
## $pev
## [1] 1.0000000 0.7869822 0.7293233 0.7079241 0.6990952
##
## $pacf
## [1] 0.4615385 -0.2706767 0.1712926 -0.1116760
##
## $blpc
## $blpc[[1]]
## [1] 0.4615385
##
## $blpc[[2]]
## [1] 0.5864662 -0.2706767
##
## $blpc[[3]]
## [1] 0.6328311 -0.3711340 0.1712926
##
## $blpc[[4]]
## [1] 0.6519604 -0.4125808 0.2419647 -0.1116760
```

innovations MA(1)

```
ma1.acvf <- as.vector(ARMAacf(ma=c(2/3),lag=4))
ma1.pacvf <- as.vector(ARMAacf(ma=c(2/3),lag=4,pacf = TRUE))
(results <- innovations.algorithm(ma1.acvf))
```

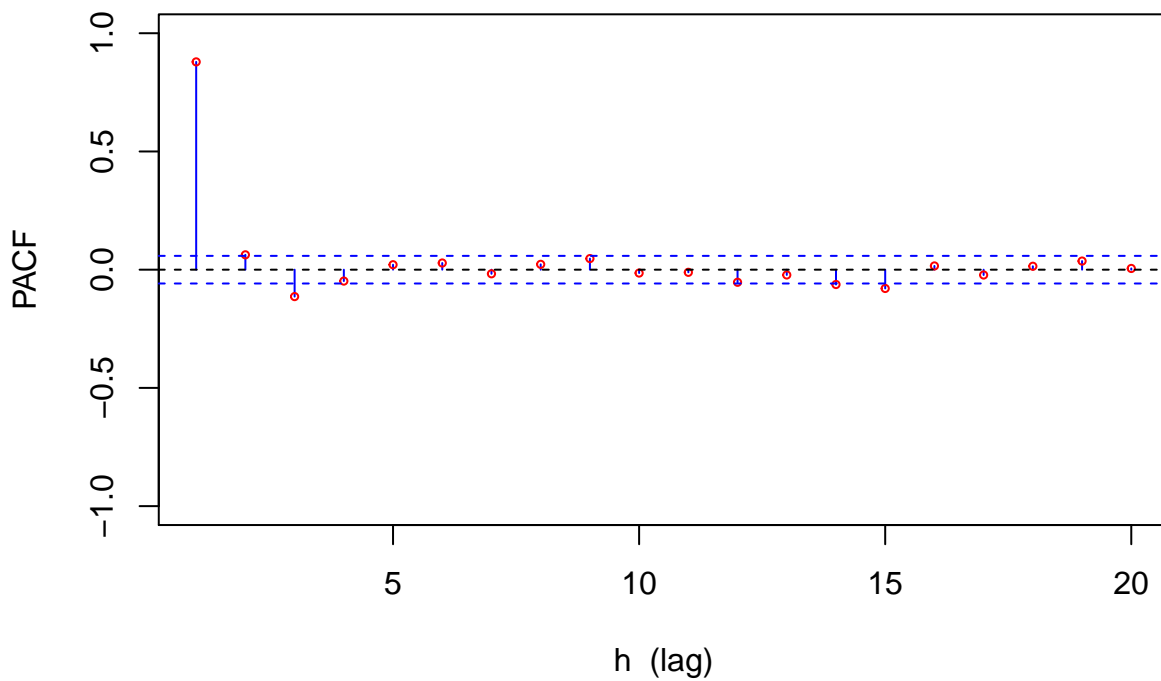
```
## $vs
## [1] 1.0000000 0.7869822 0.7293233 0.7079241 0.6990952
##
## $thetas
## $thetas[[1]]
## [1] 0.4615385
##
## $thetas[[2]]
## [1] 0.5864662 0.0000000
##
## $thetas[[3]]
## [1] 0.6328311 0.0000000 0.0000000
##
## $thetas[[4]]
## [1] 0.6519604 0.0000000 0.0000000 0.0000000
```



Problem 26

Plotting PACF for ENSO

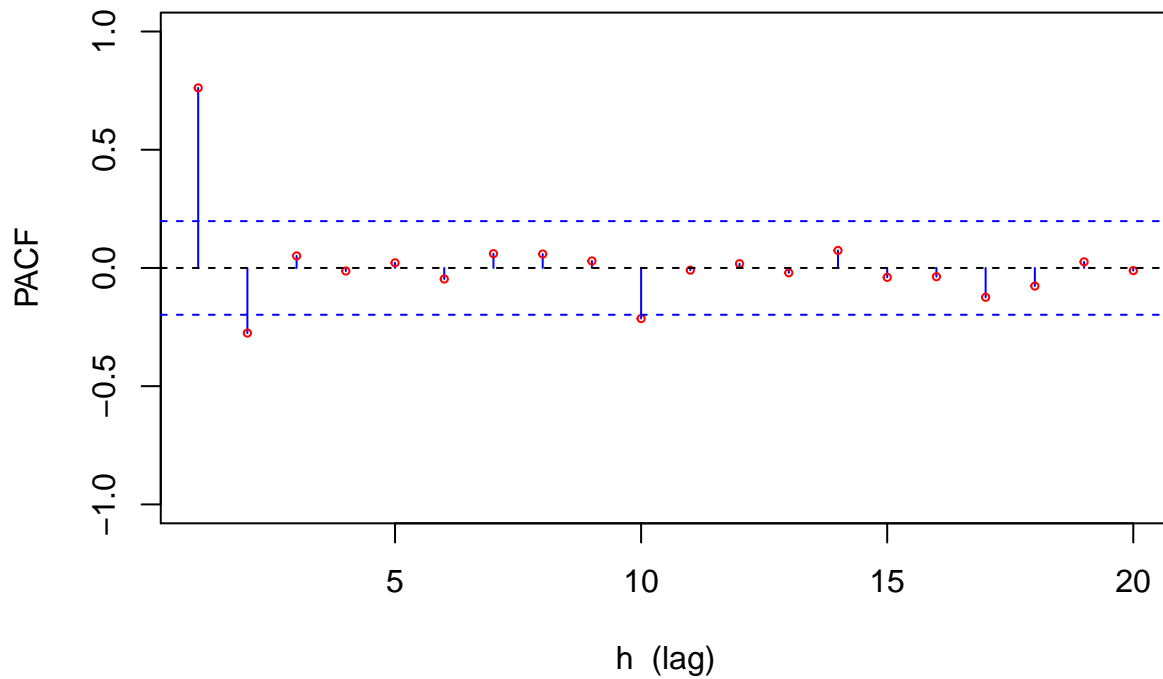
Sample PACF for ENSO Series



We have PACF at lag 1,3 is out of 95% bounds, so it is not white noise.

Plotting PACF for residuals $\{rt\}$ from Lake Huron level time series

Sample PACF for Lake Hurom residuals(rt) Series

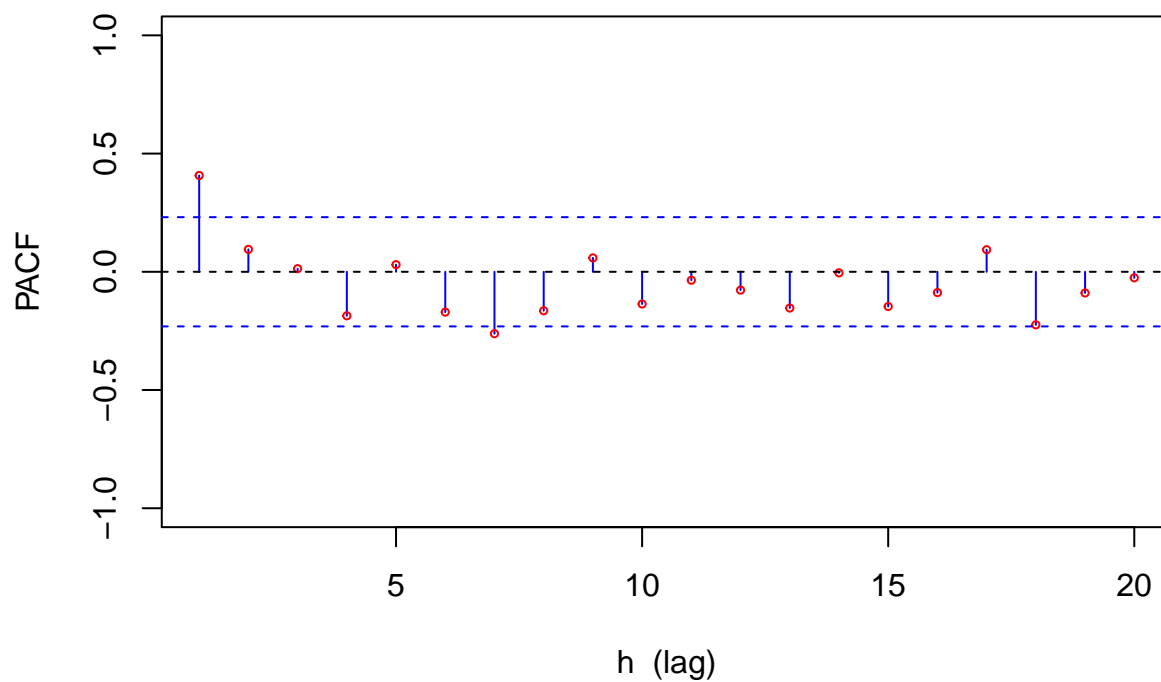


Lake Huron looks to be AR(2) model and, for $h > p$ (which is 2), we see that $\phi_{h,h}$ is 0. This is not a semblance of white noise as PACF is IID(0,1/98) for orders greater than 2 .

Sample PACF residuals $\{rt\}$ from accidental deaths time series

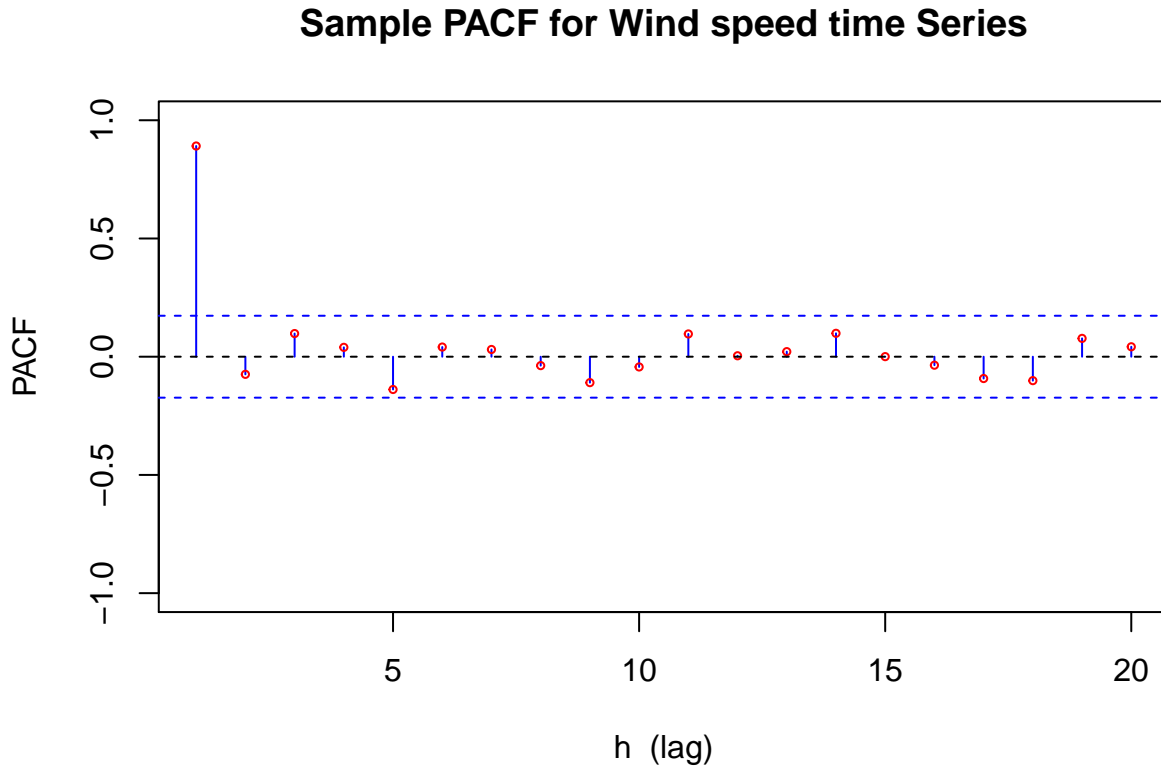
```
## [1] 72
```

Sample PACF residuals {rt} from accidental deaths time series



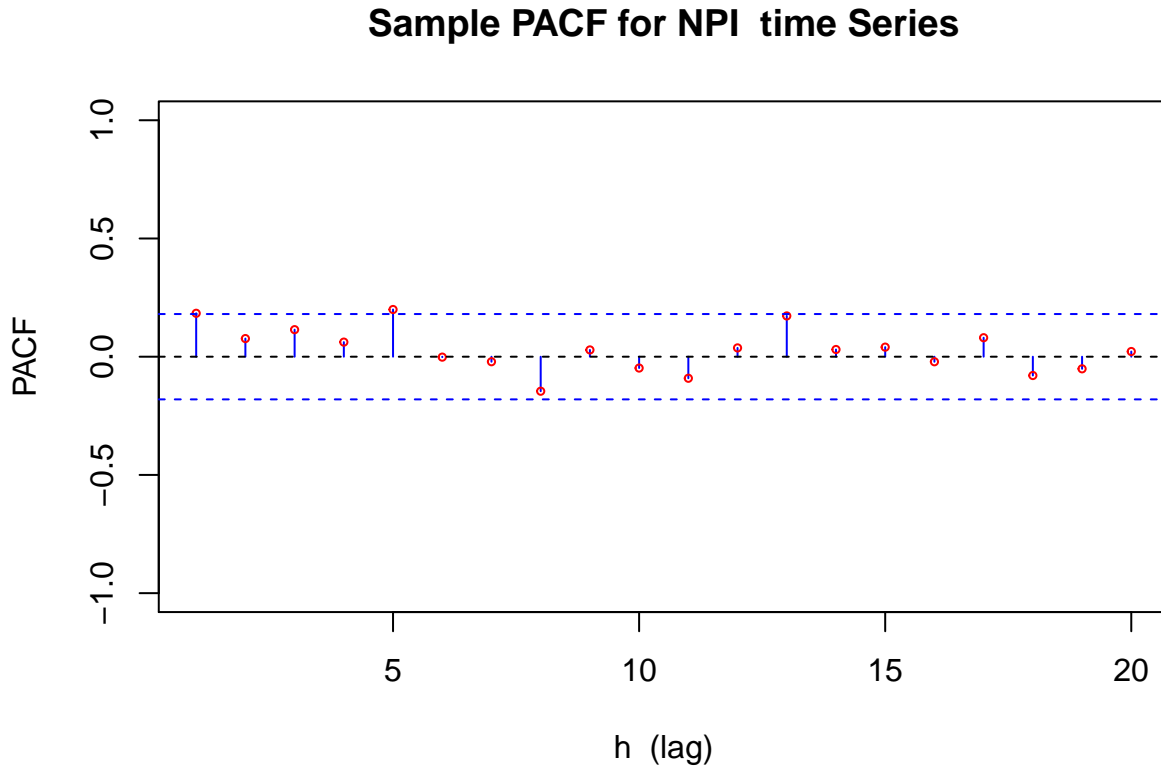
AD time series looks to be AR(1) model and, for $h > p$ (which is 1), we see that $\phi_{h,h}$ is 0. This is not a semblance of white noise as PACF is IID(0,1/72) for orders greater than 1.

Sample PACF for wind speed time series



Windspeed time series looks to be AR(1) model and, for $h > p$ (which is 1), we see that $\phi_{h,h}$ is 0. This is not a semblance of white noise as PACF is IID(0,1/128) for orders greater than 1.

Sample PACF for NPI time series



MPI time series looks to be white noise, we see that $\phi_{1,1}$ through $\phi_{h,h}$ are approximately 0. This is infact a semblance of white noise as PACF is IID(0,1/118) ($h \ll n$).