

Regression and Time Series HW7

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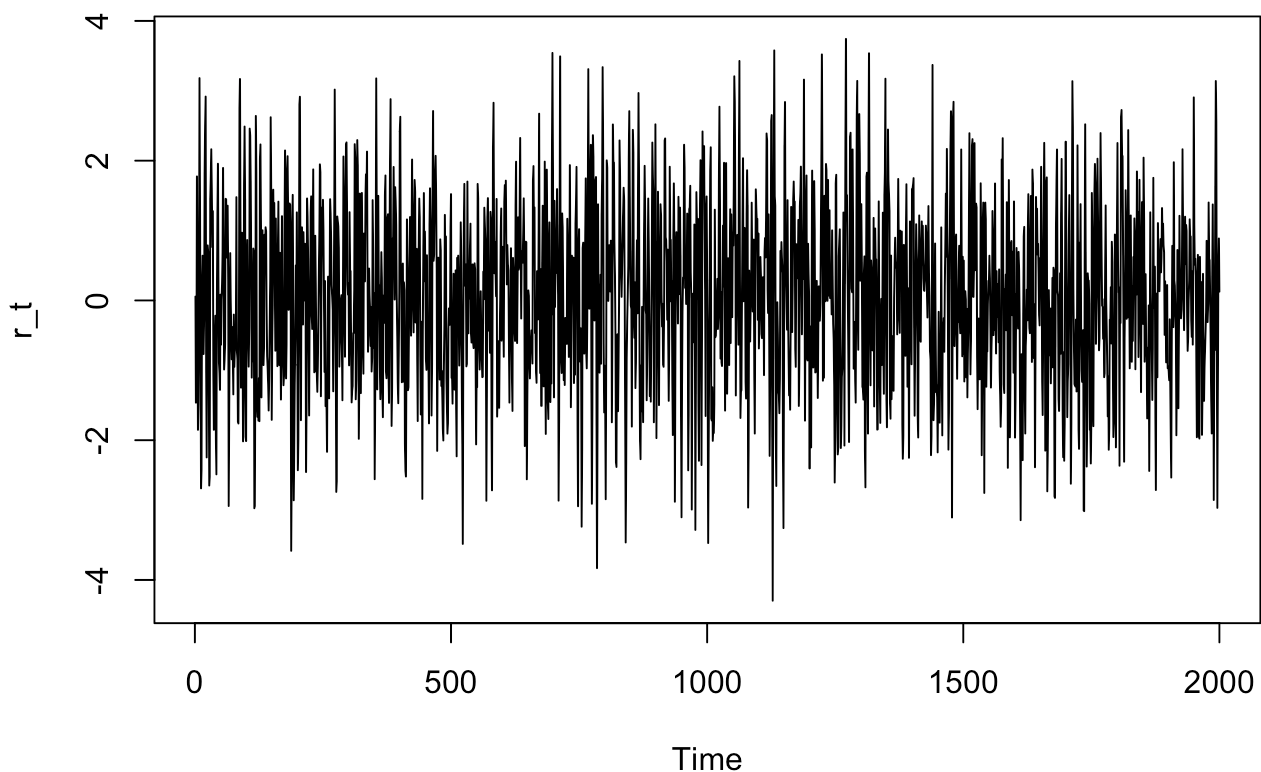
- c. Simulate a time series of length $T=2000$ from this model. Create a time series plot. Compute the lag-1, lag-2, and lag-3 sample autocorrelations

```
set.seed(1)
T <- 2000
#rt = 0.01 + 0.6rt-1 - 0.4rt-2 + at
a_t <- rnorm(n=T, mean=0, sd=sqrt(0.02))

r_t <- 0.01 + arima.sim(model=list(order=c(2, 0, 0), ar=c(0.6, -.4)),n =T) + a_t
```

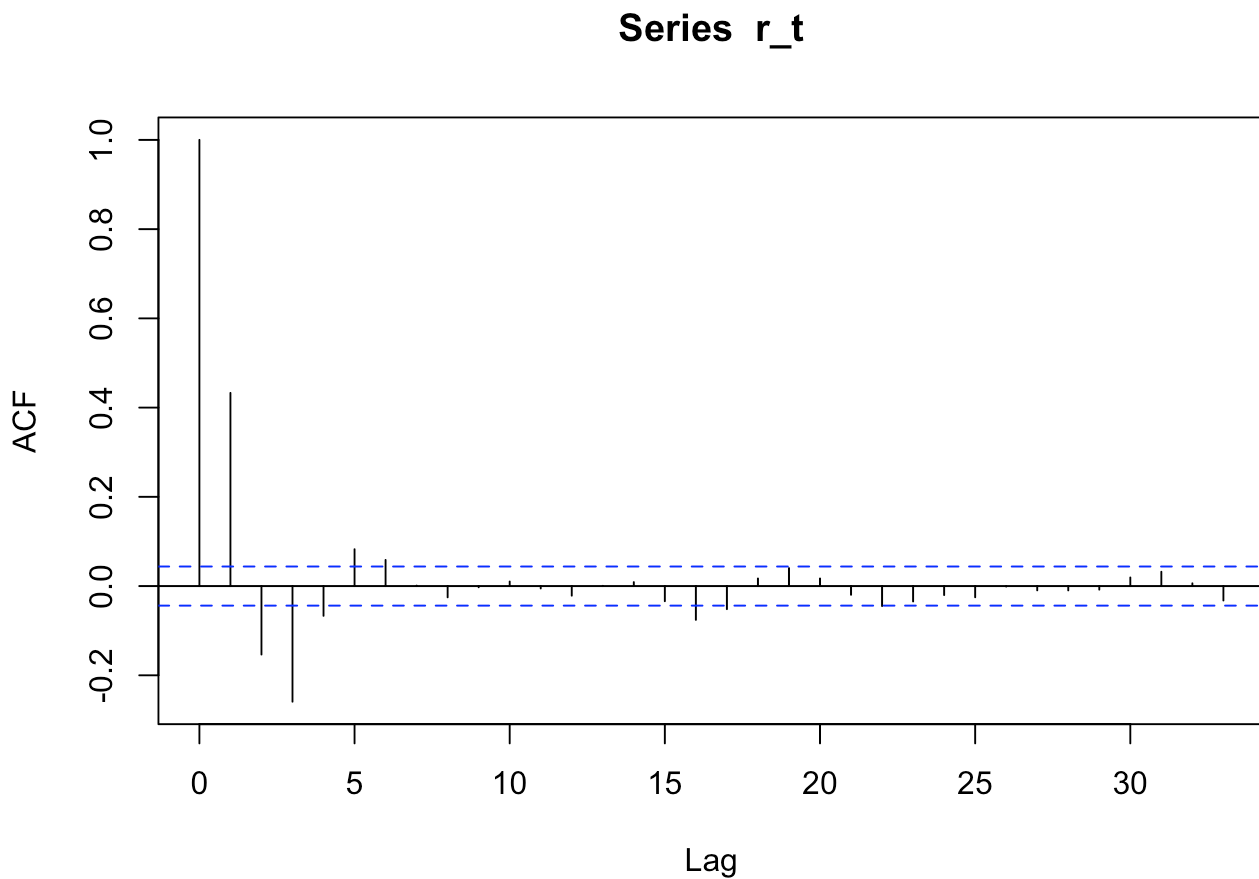
Let's now create a time series plot

```
plot.ts(r_t)
```



Sample autocorrelation plot

```
acf <- acf(r_t)
```



```
acf
```

```
##  
## Autocorrelations of series 'r_t', by lag  
##  
##      0      1      2      3      4      5      6      7      8      9     10  
## 1.000  0.433 -0.153 -0.259 -0.067  0.083  0.058  0.001 -0.025 -0.003  0.010  
##    11    12    13    14    15    16    17    18    19    20    21  
## -0.005 -0.022  0.000  0.009 -0.034 -0.076 -0.052  0.017  0.040  0.017 -0.020  
##    22    23    24    25    26    27    28    29    30    31    32  
## -0.045 -0.034 -0.020 -0.025 -0.001 -0.010 -0.010 -0.008  0.019  0.032  0.006  
##    33  
## -0.032
```

Calculate lag1

```
acf[1]
```

```
##  
## Autocorrelations of series 'r_t', by lag  
##  
##      1  
## 0.433
```

Calculate lag2

```
acf[2]
```

```
##  
## Autocorrelations of series 'r_t', by lag  
##  
##      2  
## -0.153
```

Calculate lag3

```
acf[3]
```

```
##  
## Autocorrelations of series 'r_t', by lag  
##  
##      3  
## -0.259
```