

Time Series Analysis & Simulations

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Simulating Time-Series Models

MA(1) Process

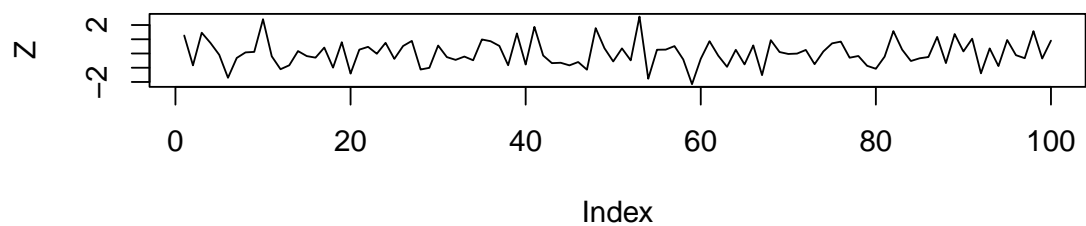
```
set.seed(0)

Z = a = rnorm(100)
theta = 0.4

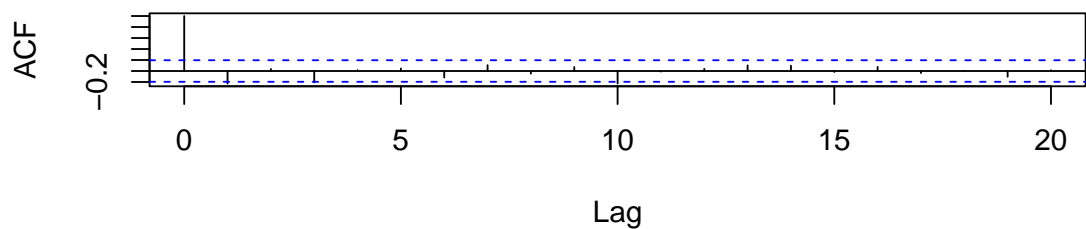
for (t in 2:100){
  Z[t] = a[t] - theta*a[t-1]
}

layout(1:2)
plot(Z, type="l")

acf(Z)
```



Series Z



MA(2) Process

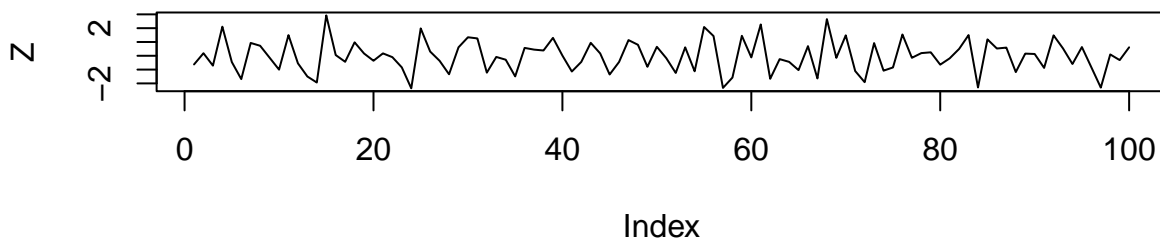
```
set.seed(1)

Z = a = rnorm(100)
theta = c(0.7, 0.4)

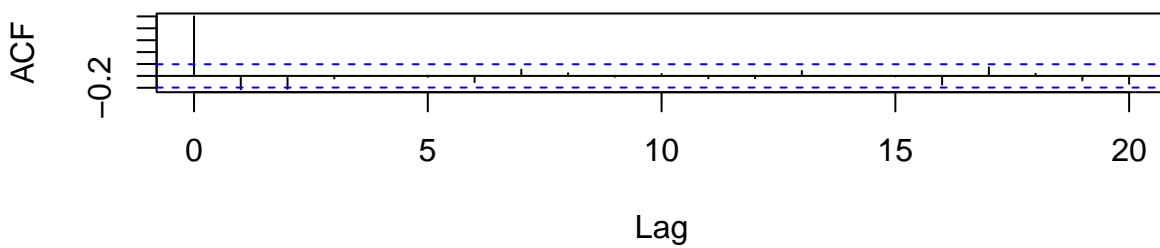
for (t in 3:100){
  Z[t] = a[t] - theta[1]*a[t-1] - theta[2]*a[t-2]
}

layout(1:2)
plot(Z, type="l")

acf(Z)
```



Series Z



AR(1) Process

```
set.seed(2)

x = a = rnorm(100)
phi = 0.7

for (t in 2:100){
  x[t] = phi*x[t-1] + a[t]
}
```

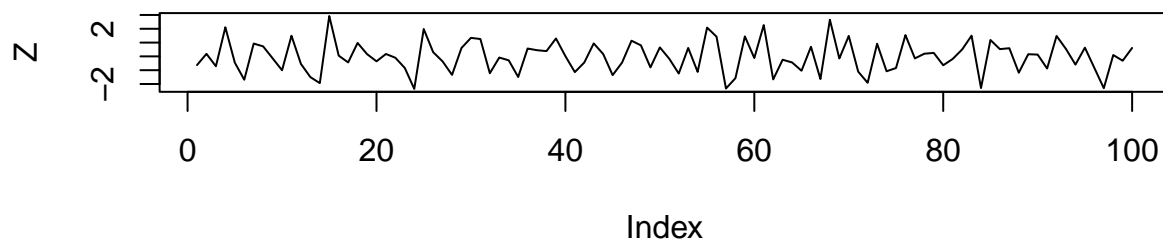
```

}

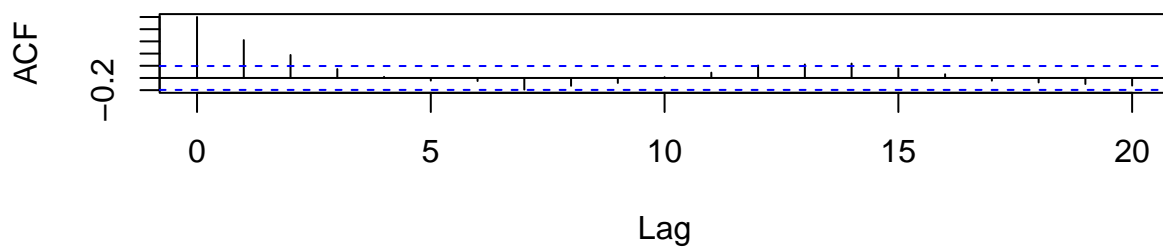
layout(1:2)
plot(Z, type="l")

acf(x)

```



Series x



AR(2) Process

```

set.seed(3)

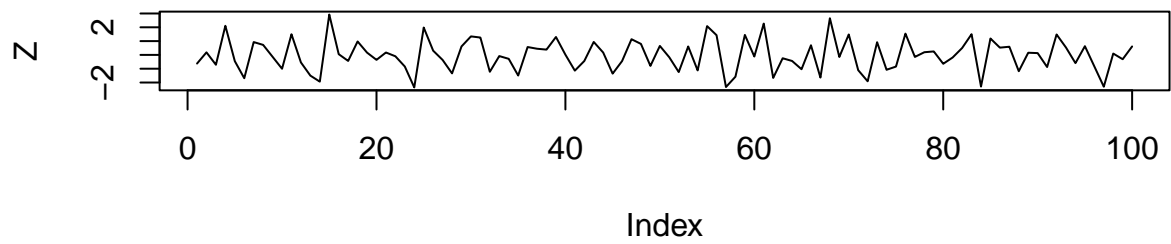
x = a = rnorm(100)
phi = c(-0.456, 0.7)

for (t in 3:100){
  x[t] = phi[1]*x[t-1] + phi[2]*x[t-2] + a[t]
}

layout(1:2)
plot(Z, type="l")

acf(x)

```



Series x

