MATH 8090: Nonstationary Time Series Models

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Contents

Monthly Price of Oil: January 1986–January 2006

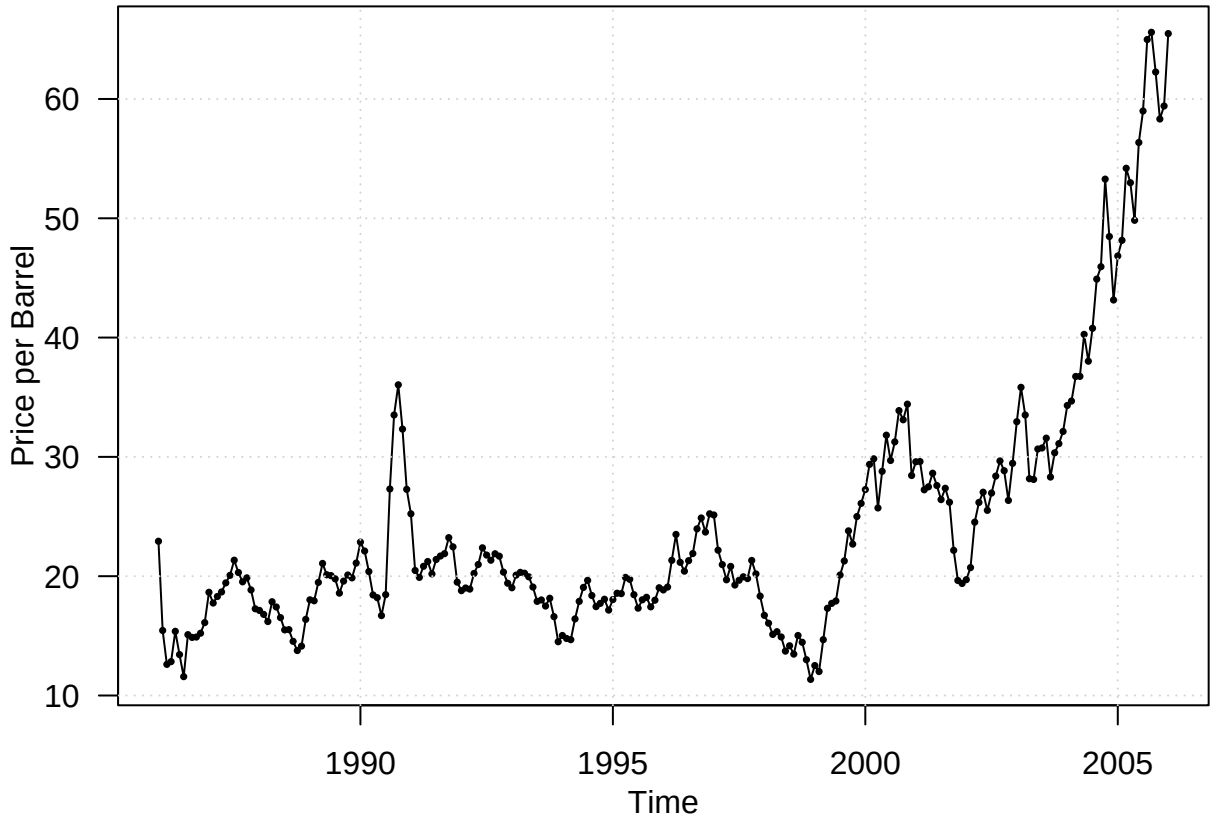
```
library(TSA)
```

```
##
## Attaching package: 'TSA'
```

```
## The following objects are masked from 'package:stats':
##
##     acf, arima
```

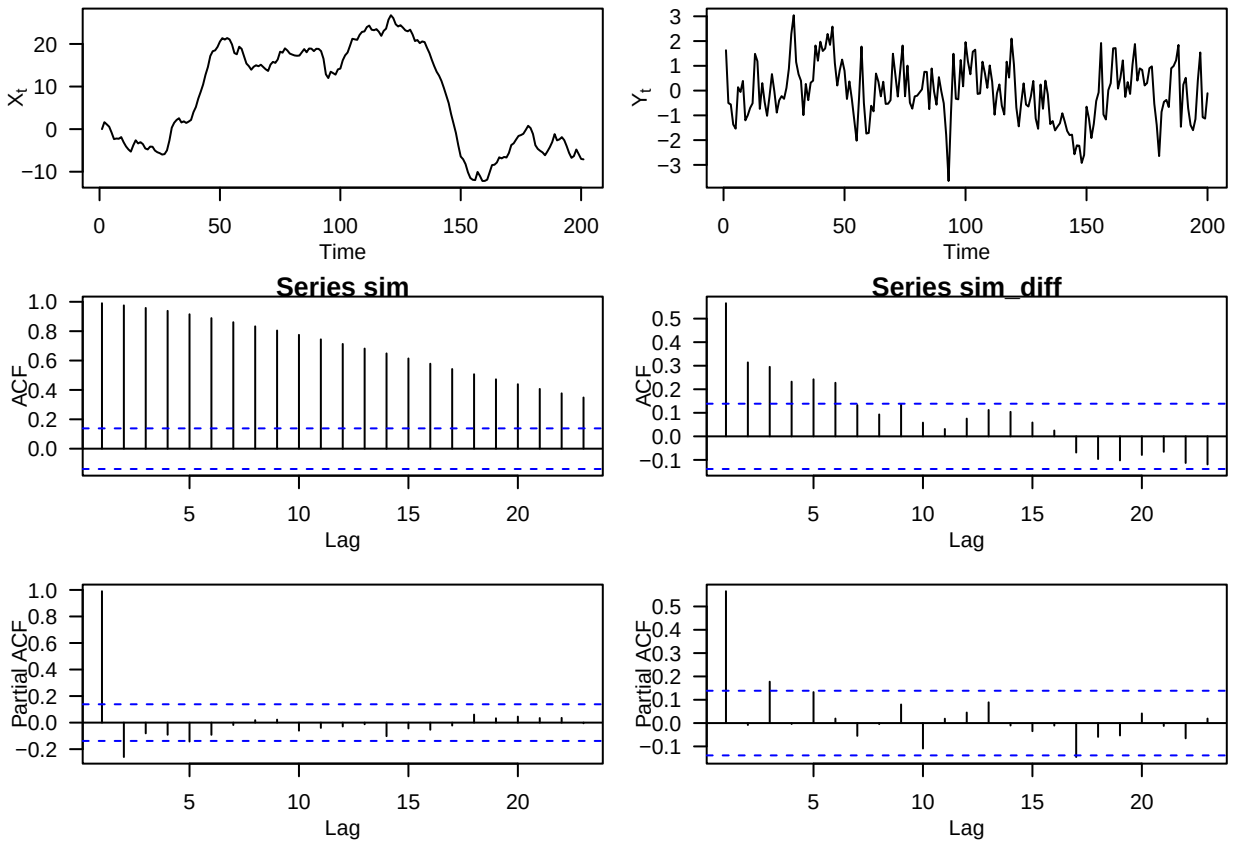
```
## The following object is masked from 'package:utils':
##
##     tar
```

```
data(oil.price)

par(las = 1, mgp = c(2, 1, 0), mar = c(3.5, 3.5, 0.8, 0.6))
plot(oil.price, ylab = 'Price per Barrel', type = 'l')
points(oil.price, pch = 16, cex = 0.5)
grid()
```

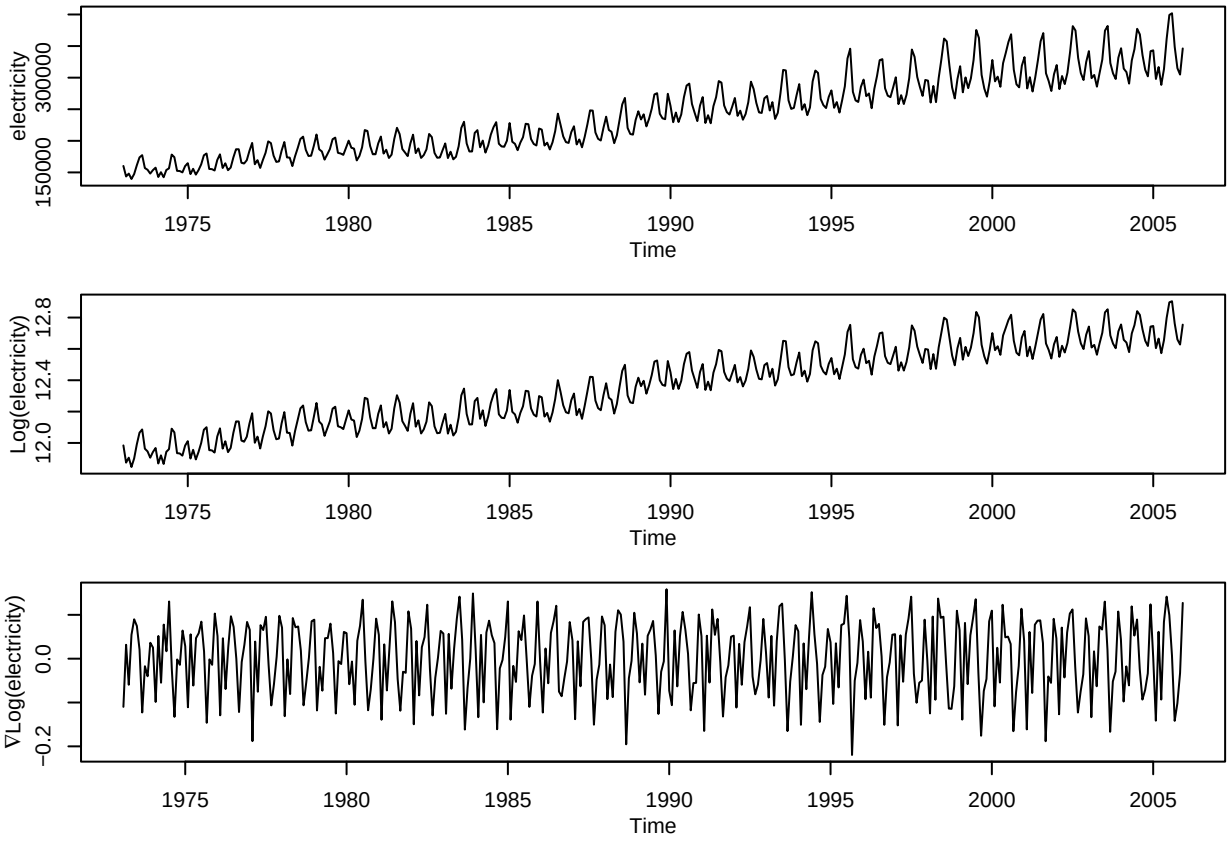


ARIMA(1,1, 0)

```
sim <- arima.sim(list(order = c(1, 1, 0), ar = 0.5), n = 200)
sim_diff <- diff(sim)

par(las = 1, mgp = c(2, 1, 0), mar = c(3.5, 3.5, 0.8, 0.6), mfrow = c(3, 2))
plot(1:201, sim, type = "l", ylab = expression(X[t]), xlab = "Time")
plot(1:200, sim_diff, type = "l", ylab = expression(Y[t]), xlab = "Time")
acf(sim)
acf(sim_diff)
pacf(sim)
pacf(sim_diff)
```




```
library(TSA)
data(electricity)

par(mgp = c(2, 1, 0), mar = c(3.5, 3.5, 0.8, 0.6), mfrow = c(3, 1))
plot(electricity)
plot(log(electricity), ylab = "Log(electricity)")
plot(diff(log(electricity)),
ylab = expression(paste(nabla, 'Log(electricity)')))
```


electricity
150000
300000
1975
1980
1985
1990
1995
2000
2005
Time
Log(electricity)
12.0
12.4
12.8
1975
1980
1985
1990
1995
2000
2005
Time
∇Log(electricity)
−0.2
0.0
1975
1980
1985
1990
1995
2000
2005
Time

References