TimeSeriesAnalysis-Chapter1

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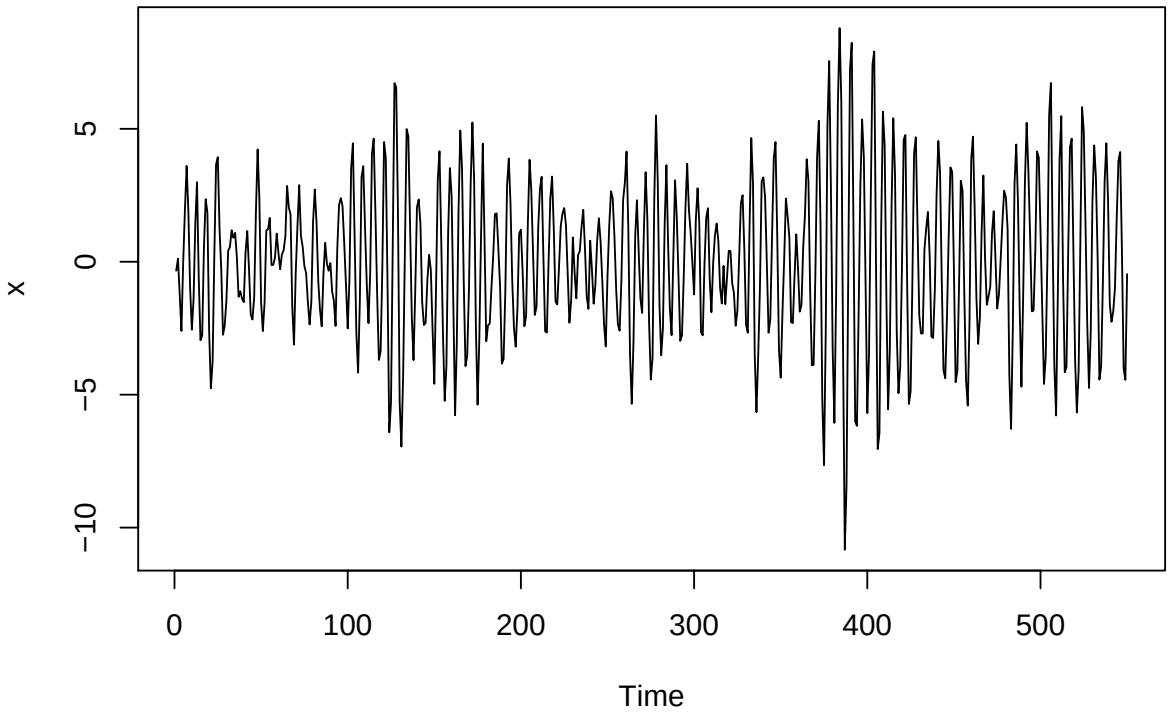
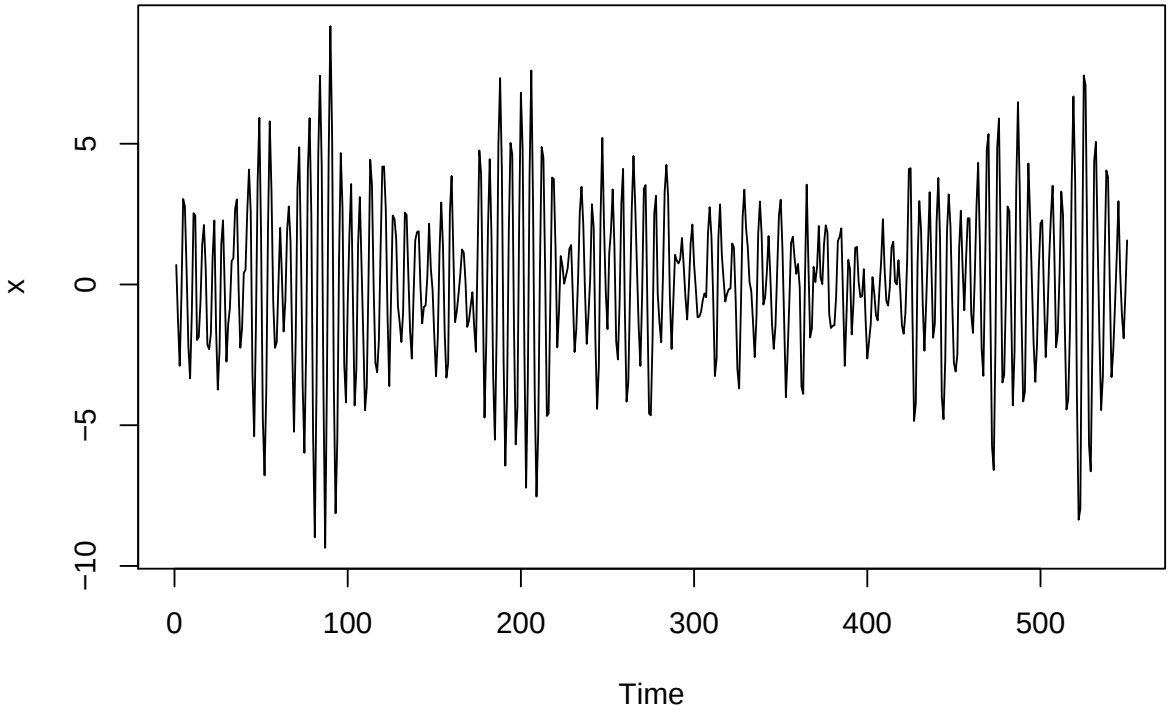
Startup investigation for Autoregressive model

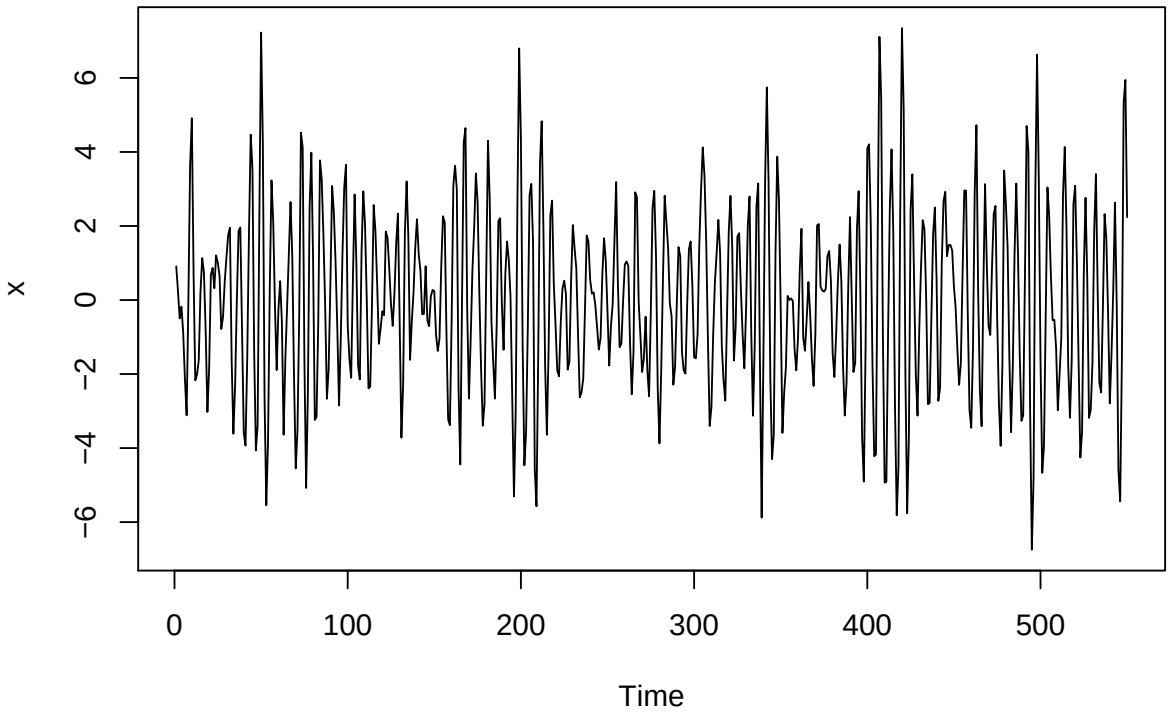
We will try to plot mutliple time series using ts.plot. First we simulate n autoregressive $AR(2)$ time series.

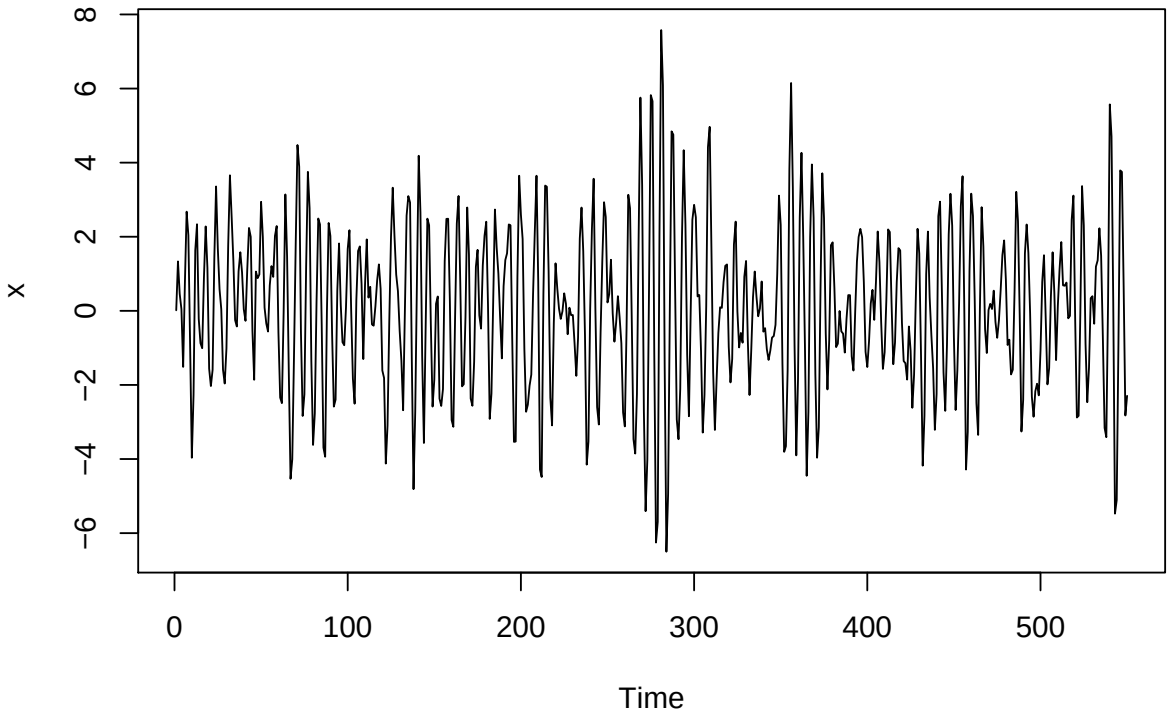
$$x_t = \phi_1 x_{t-1} \dots \phi_p x_{t-p} + \omega_t$$

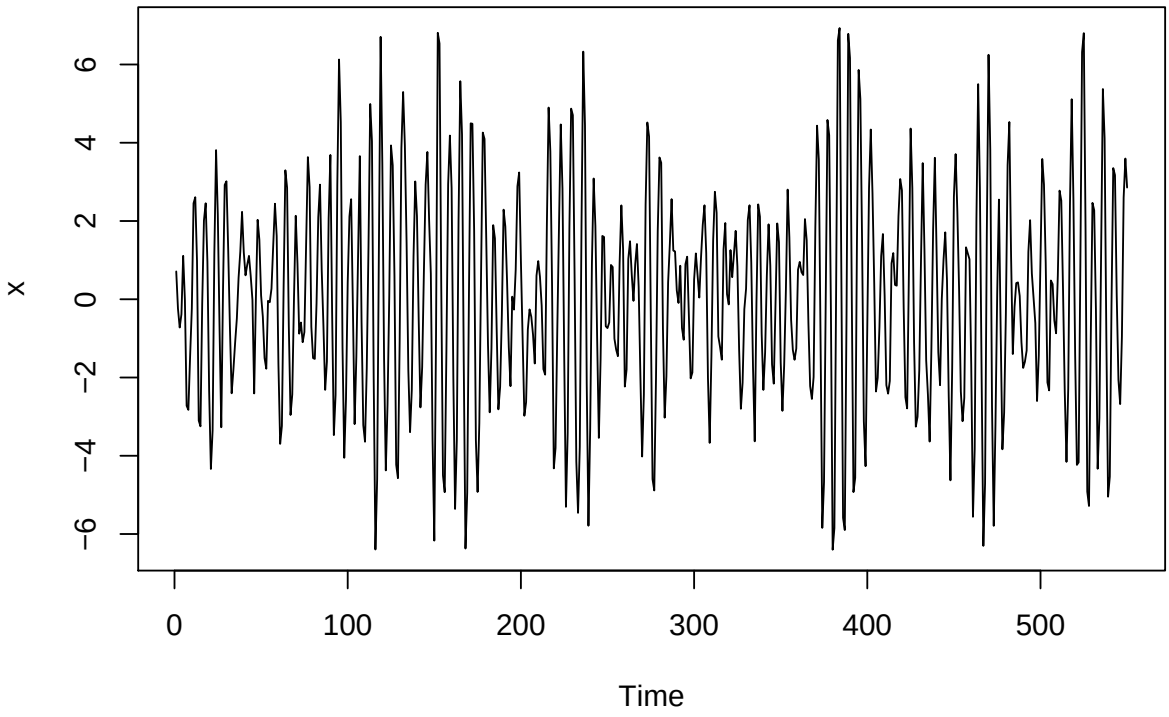
```
nseries <- 10
samples_per_series <- 550
phi1 <- 1
phi2 <- -0.9

simulated <- matrix(0, nrow = samples_per_series, ncol = nseries)

for (i in 1:nseries) {
    w <- rnorm(550, 0, 1)
    x <- filter(w, filter = c(phi1, phi2), method = "recursive")
    simulated[, i] = x
    plot.ts(x)
}
```

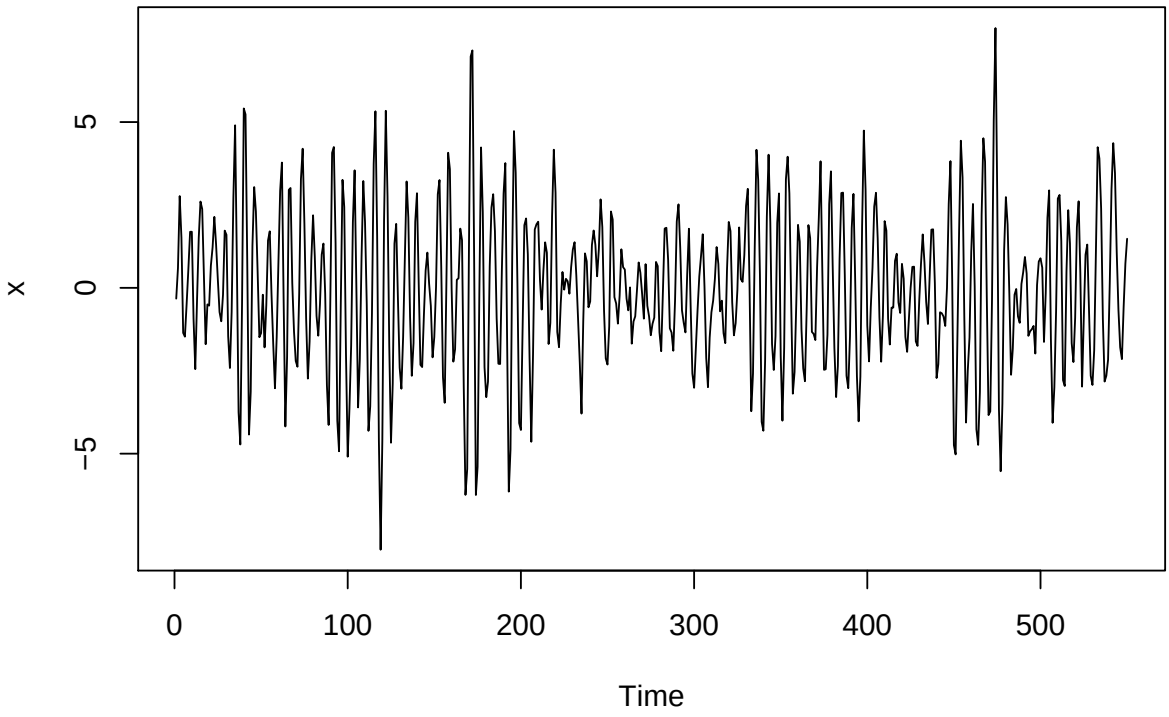

x
5
0
−5
−10
0
100
200
300
400
500
Time

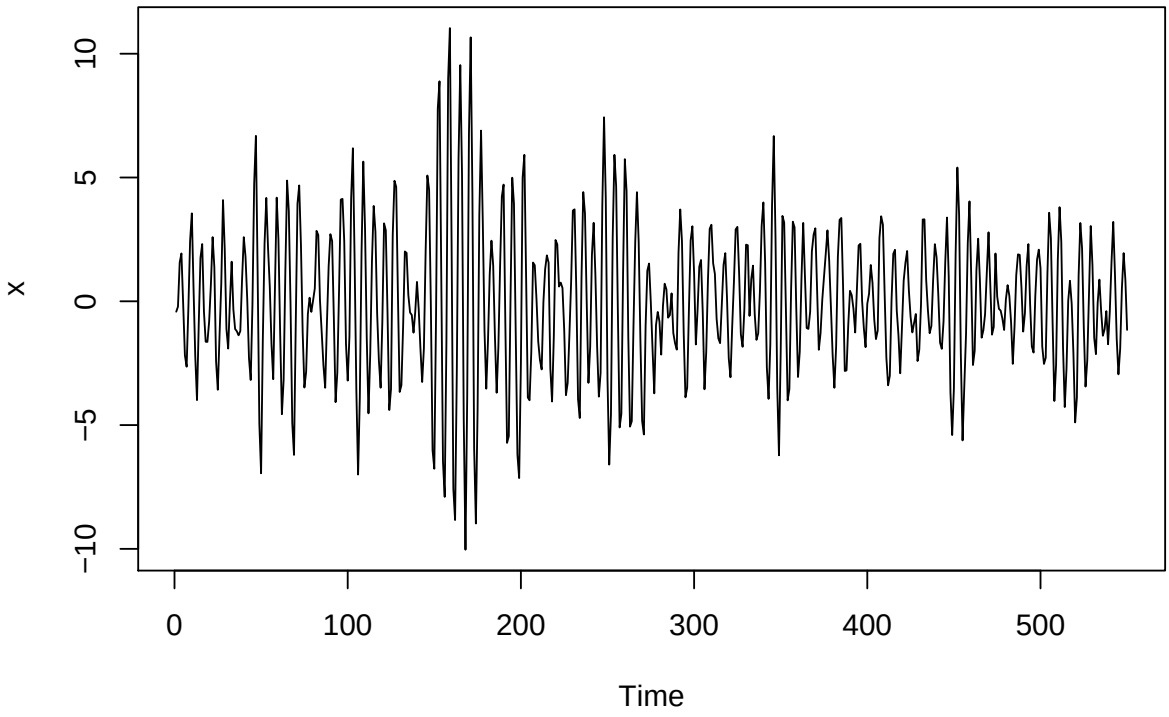

x
5
0
−5
−10
0
100
200
300
400
500
Time

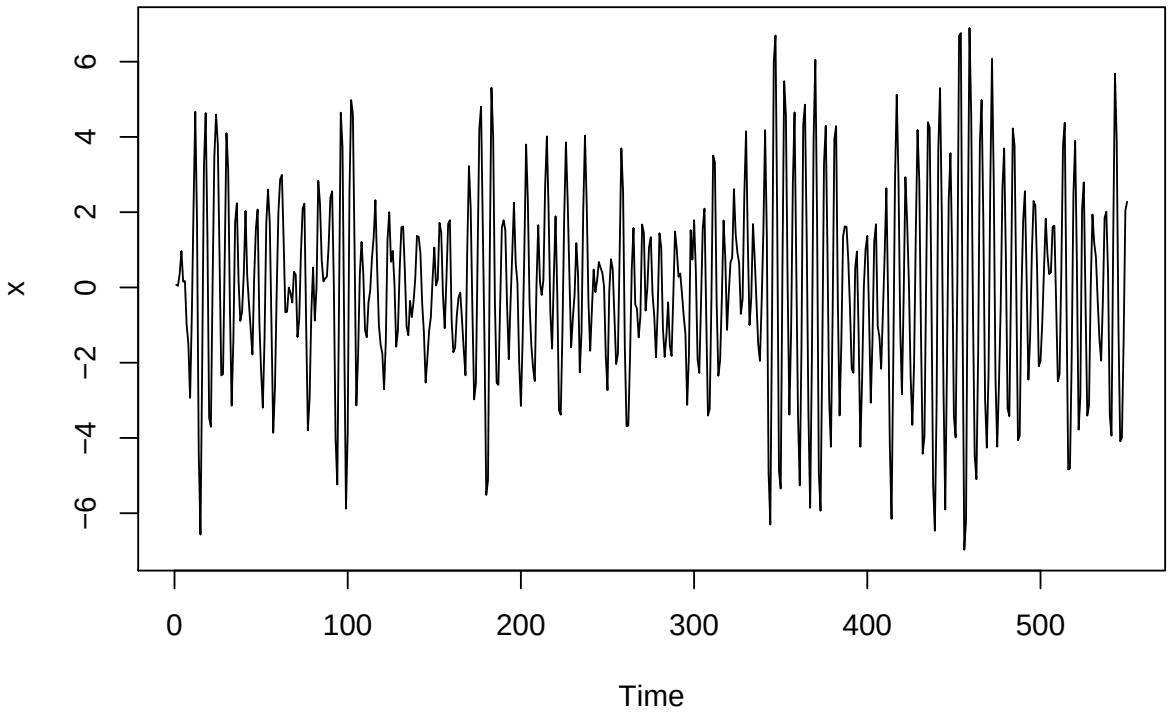

x
6
4
2
0
−2
−4
−6
0
100
200
300
400
500
Time

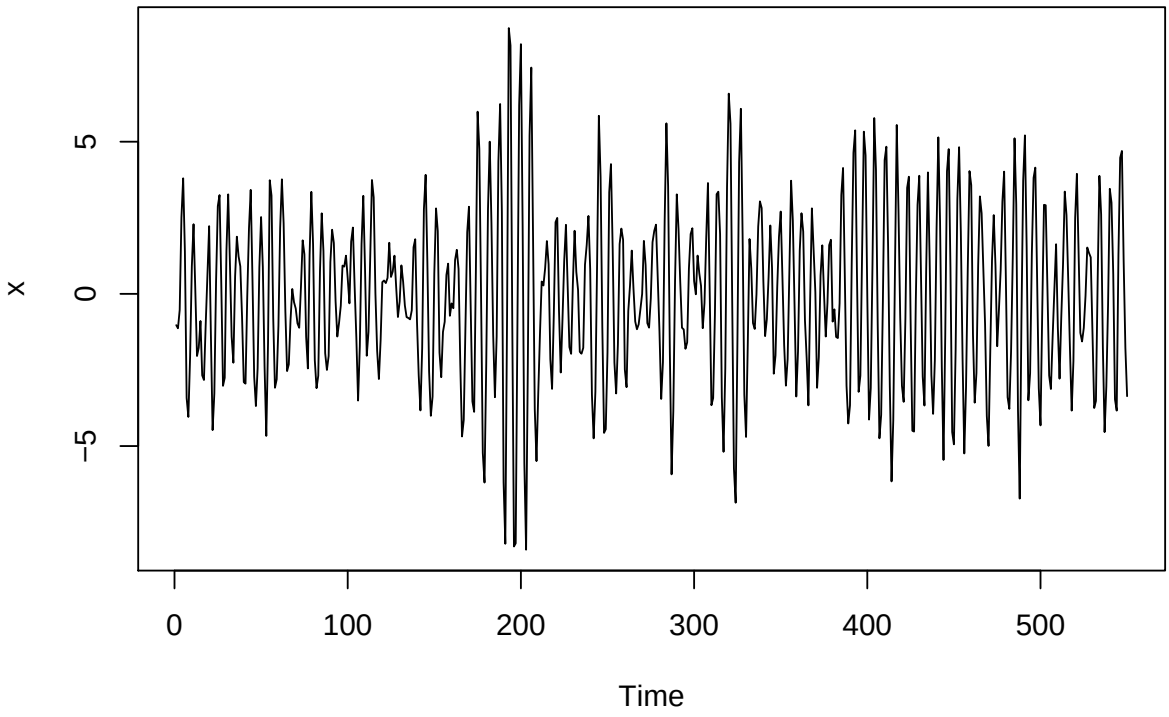

x
8
6
4
2
0
−2
−4
−6
0
100
200
300
400
500
Time

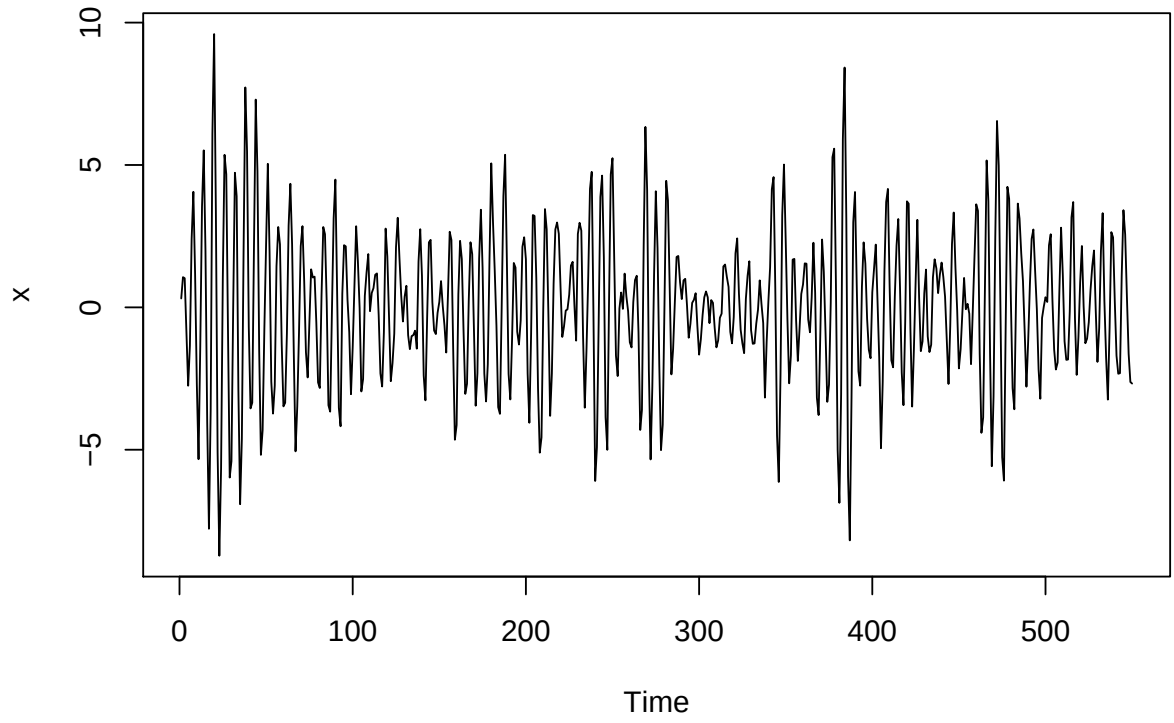

x
6
4
2
0
−2
−4
−6
0
100
200
300
400
500
Time


x
5
0
−5
0
100
200
300
400
500
Time

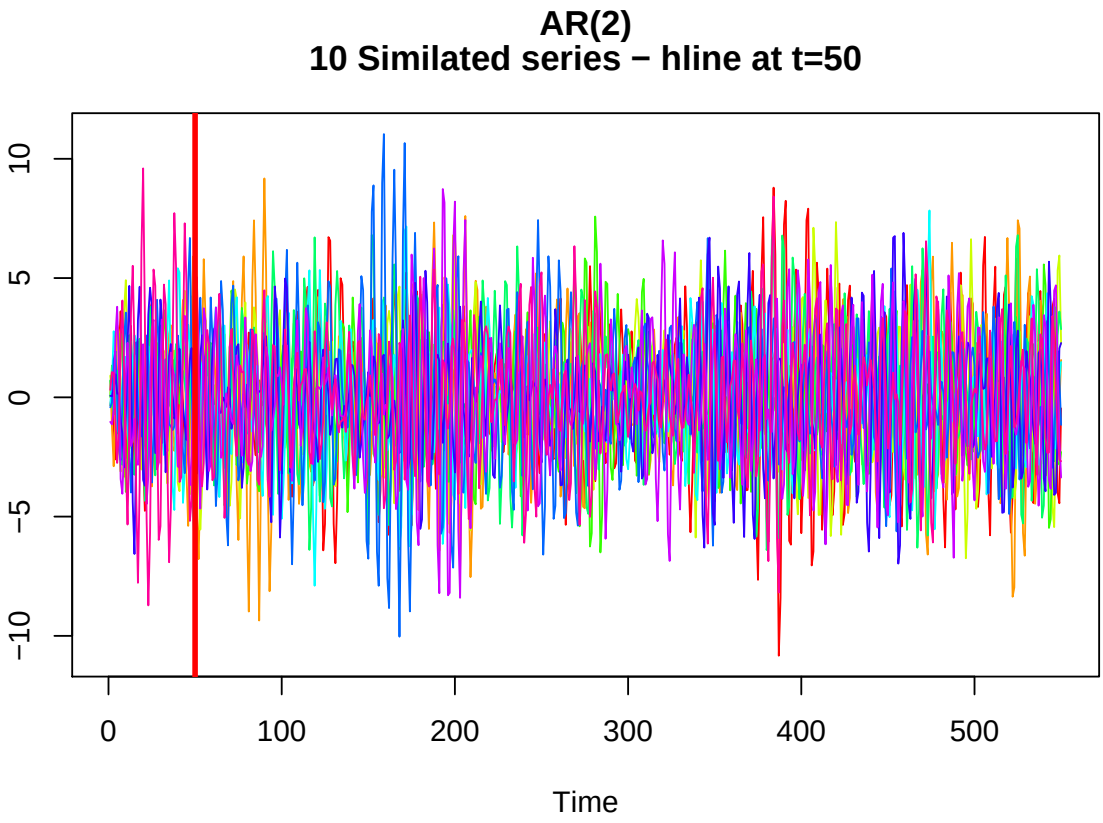

x
10
5
0
−5
−10
0
100
200
300
400
500
Time


x
6
4
2
0
−2
−4
−6
0
100
200
300
400
500
Time


x
5
0
−5
0
100
200
300
400
500
Time




```
ts.plot(simulated, gpars = list(col = rainbow(10)))
abline(v = 50, col = "red", lwd = 3)
title(c("AR(2)", "10 Similated series - hline at t=50"))
```


AR(2)
10 Similated series − hline at t=50
10
5
0
−5
−10
0
100
200
300
400
500
Time