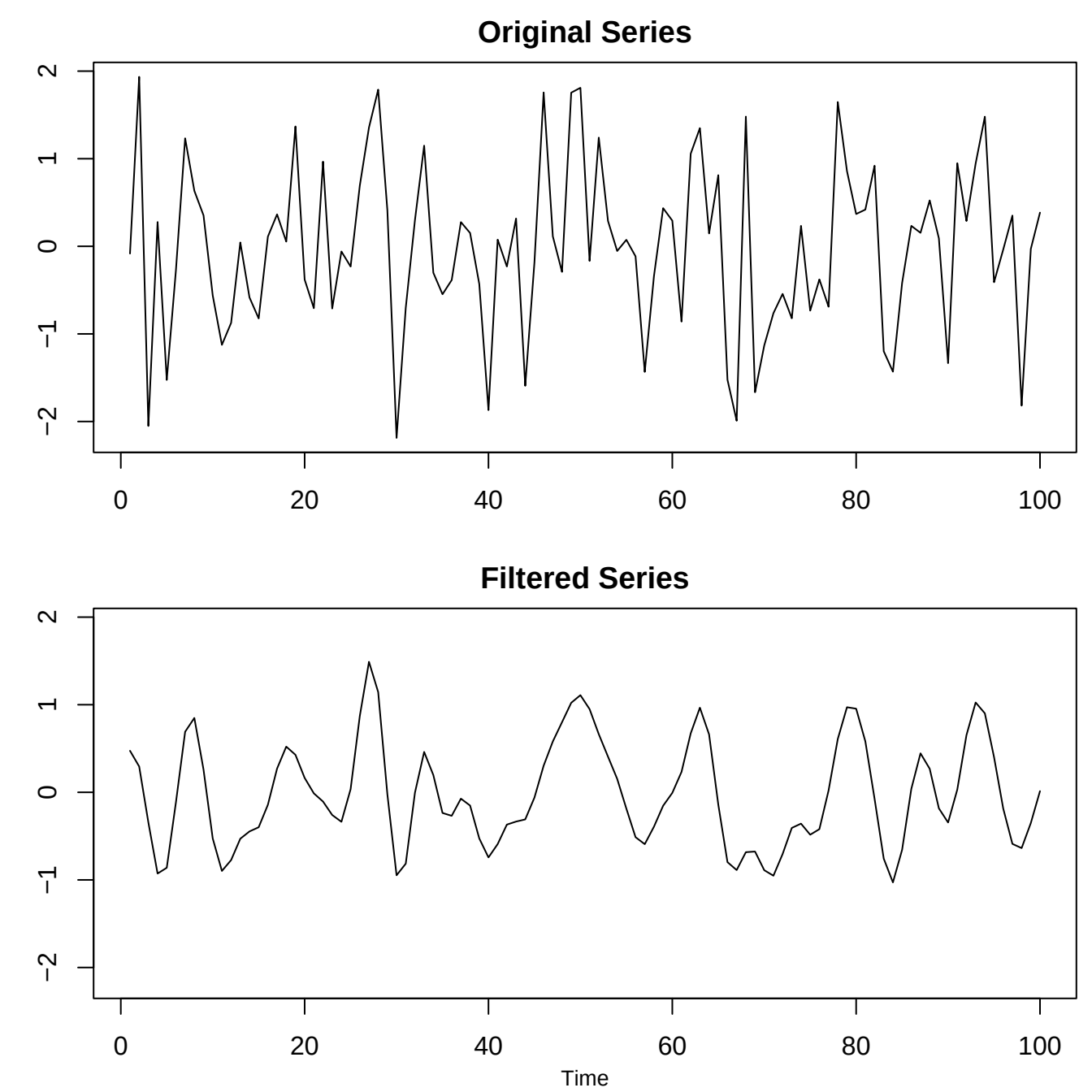
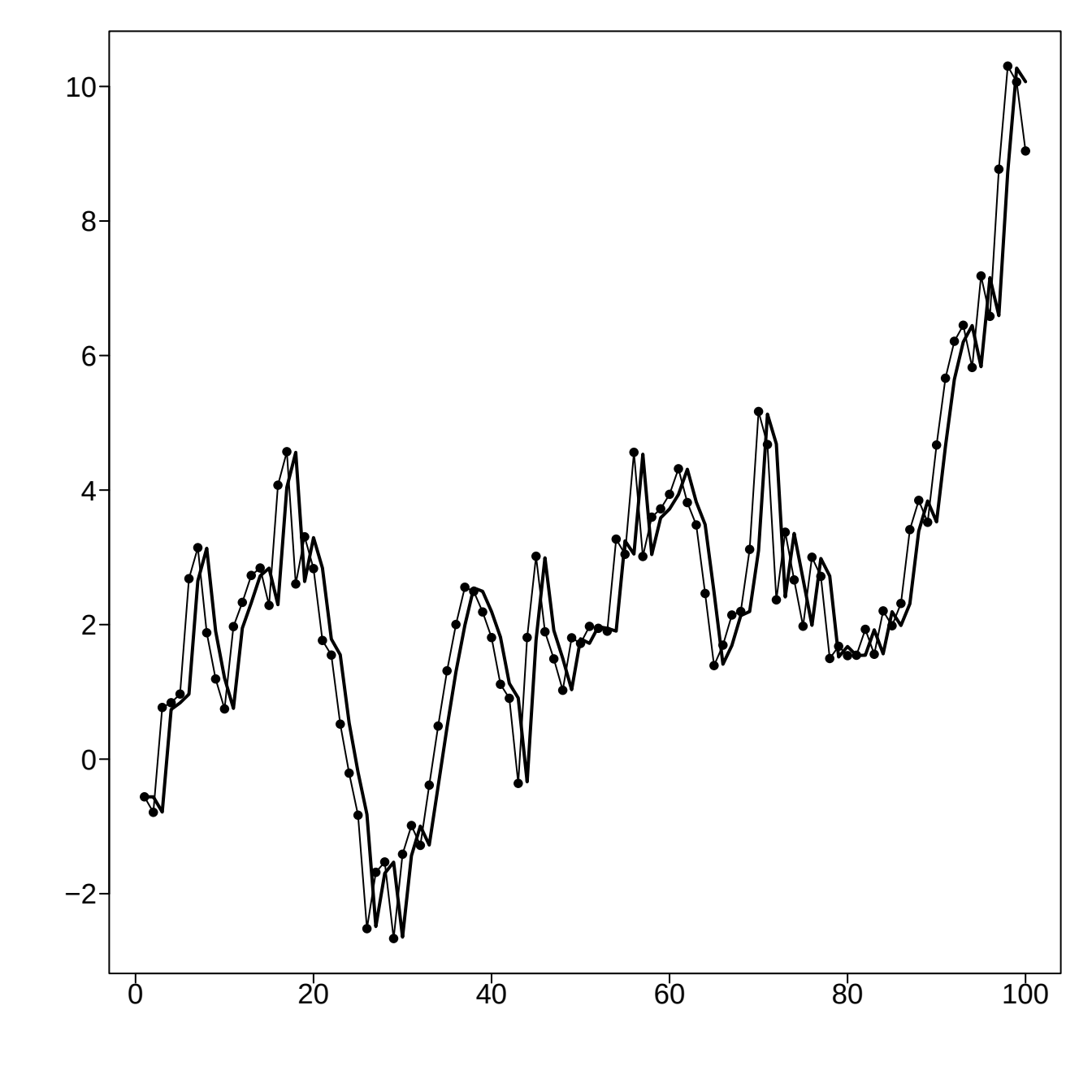
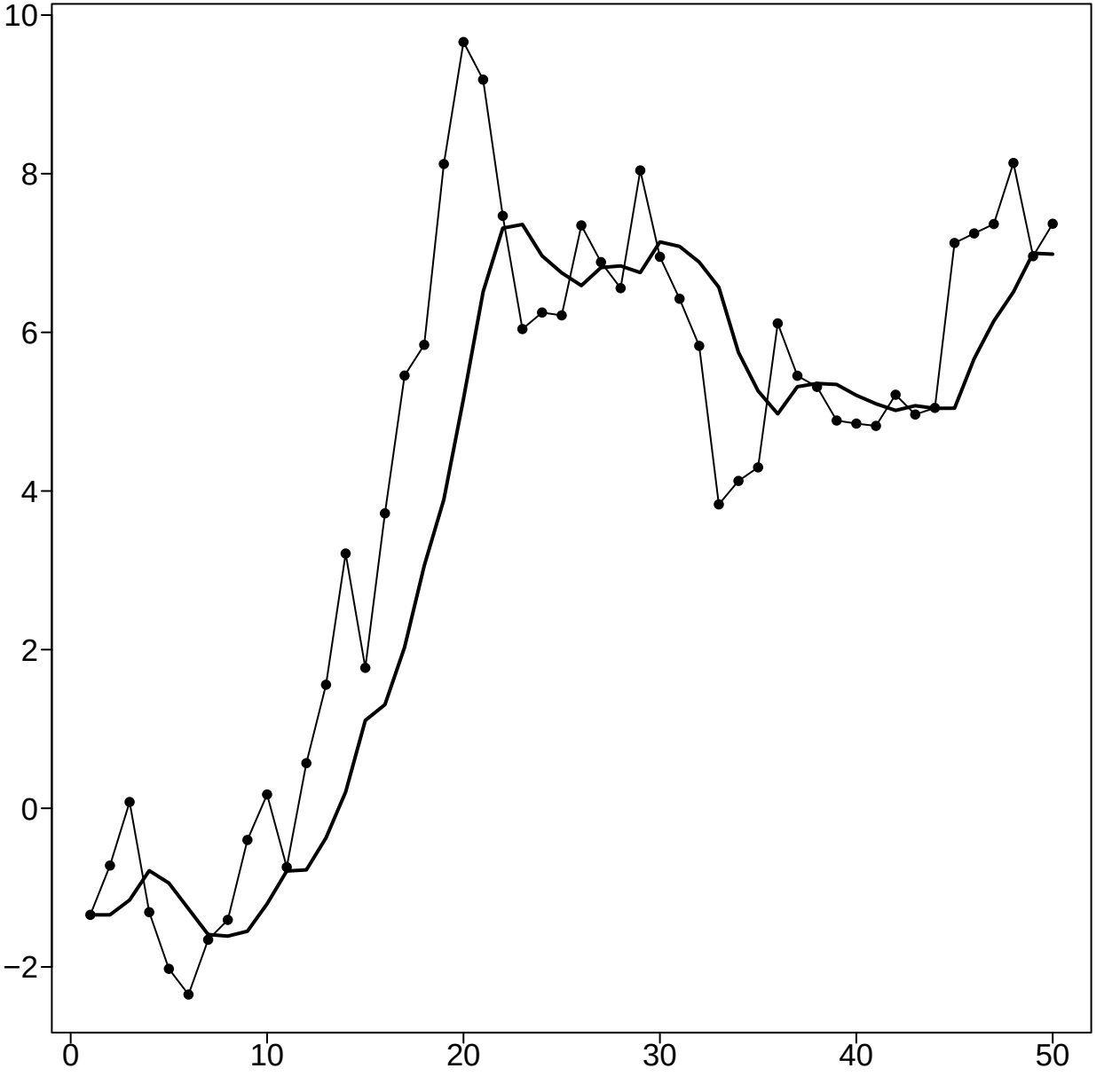
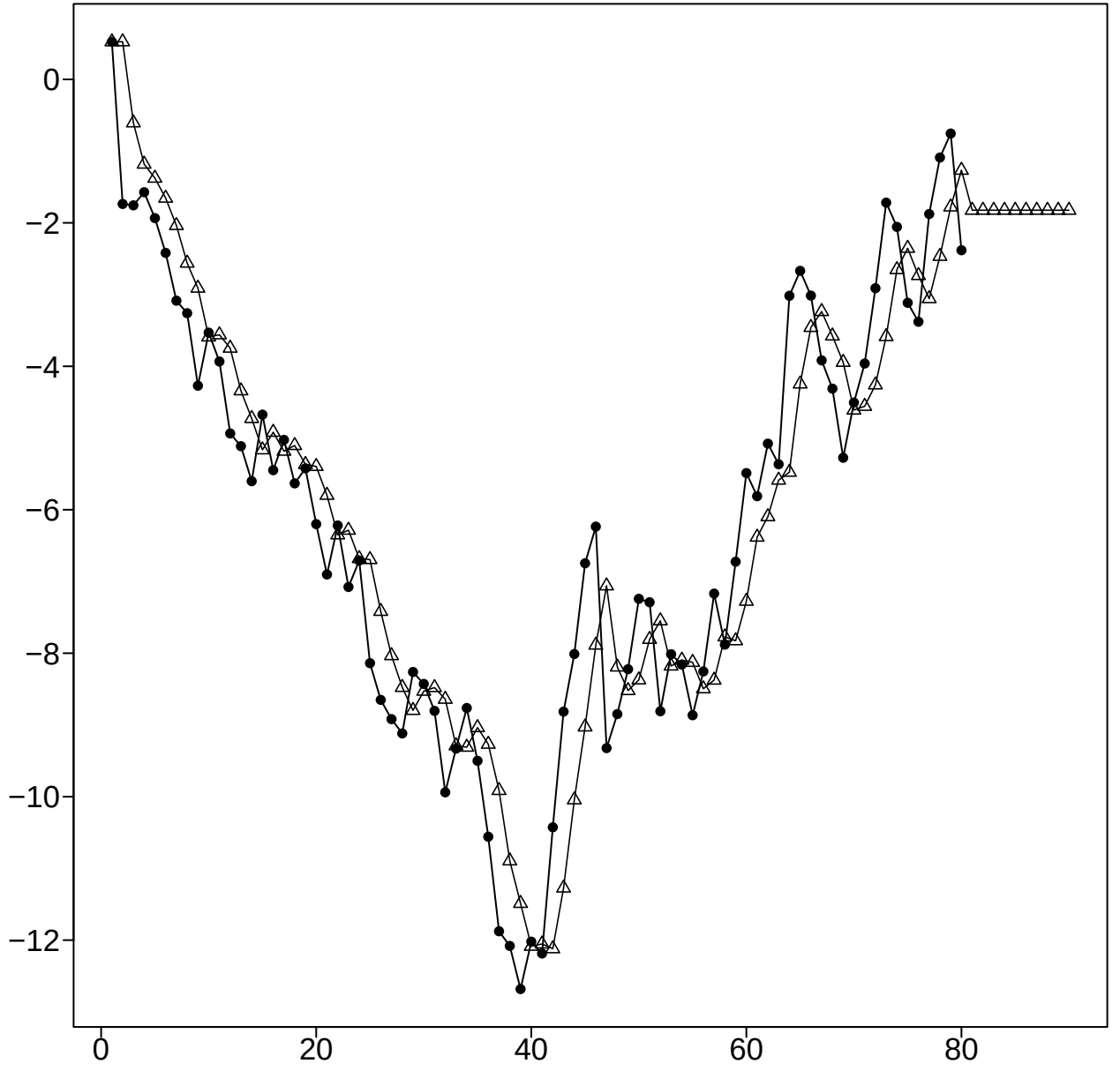
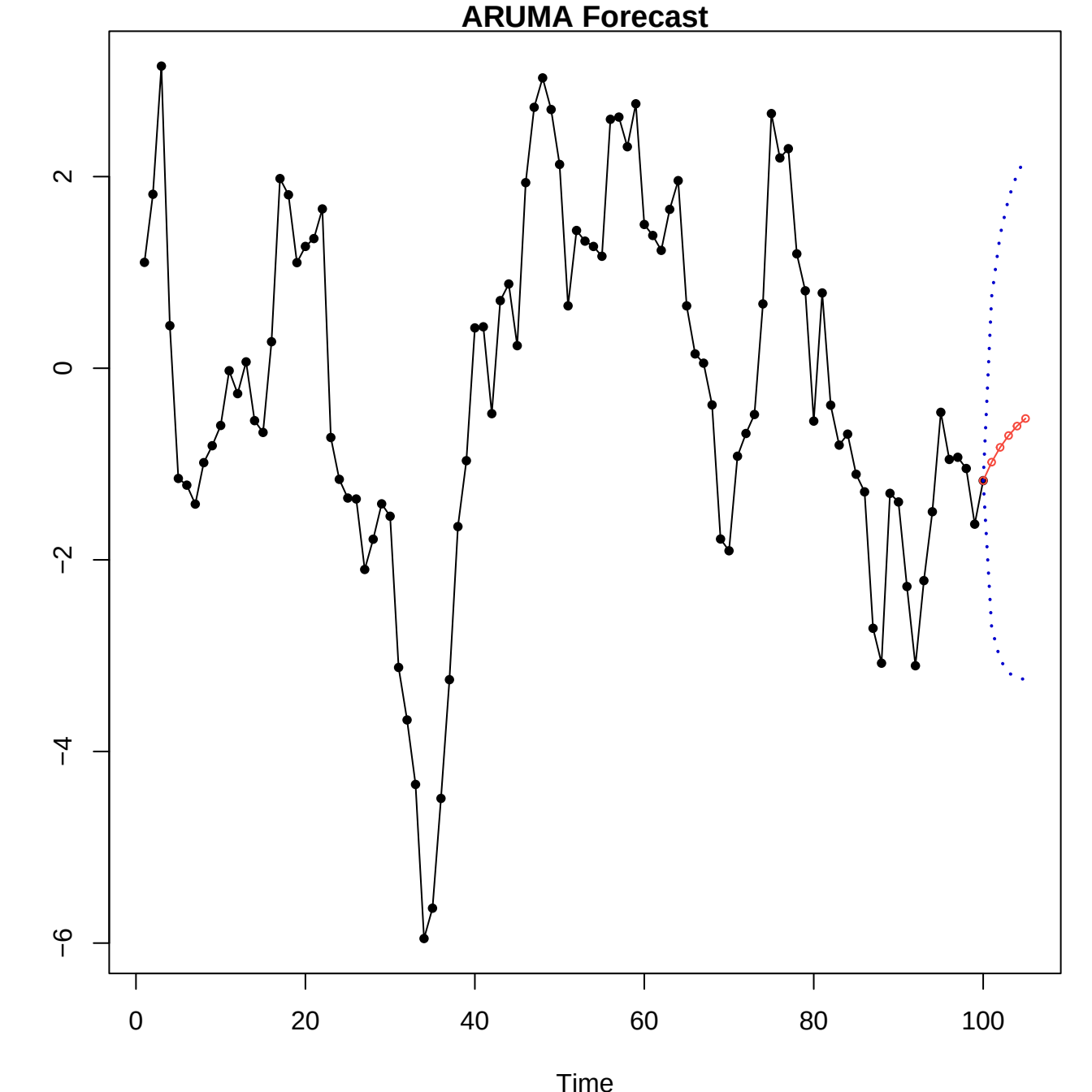
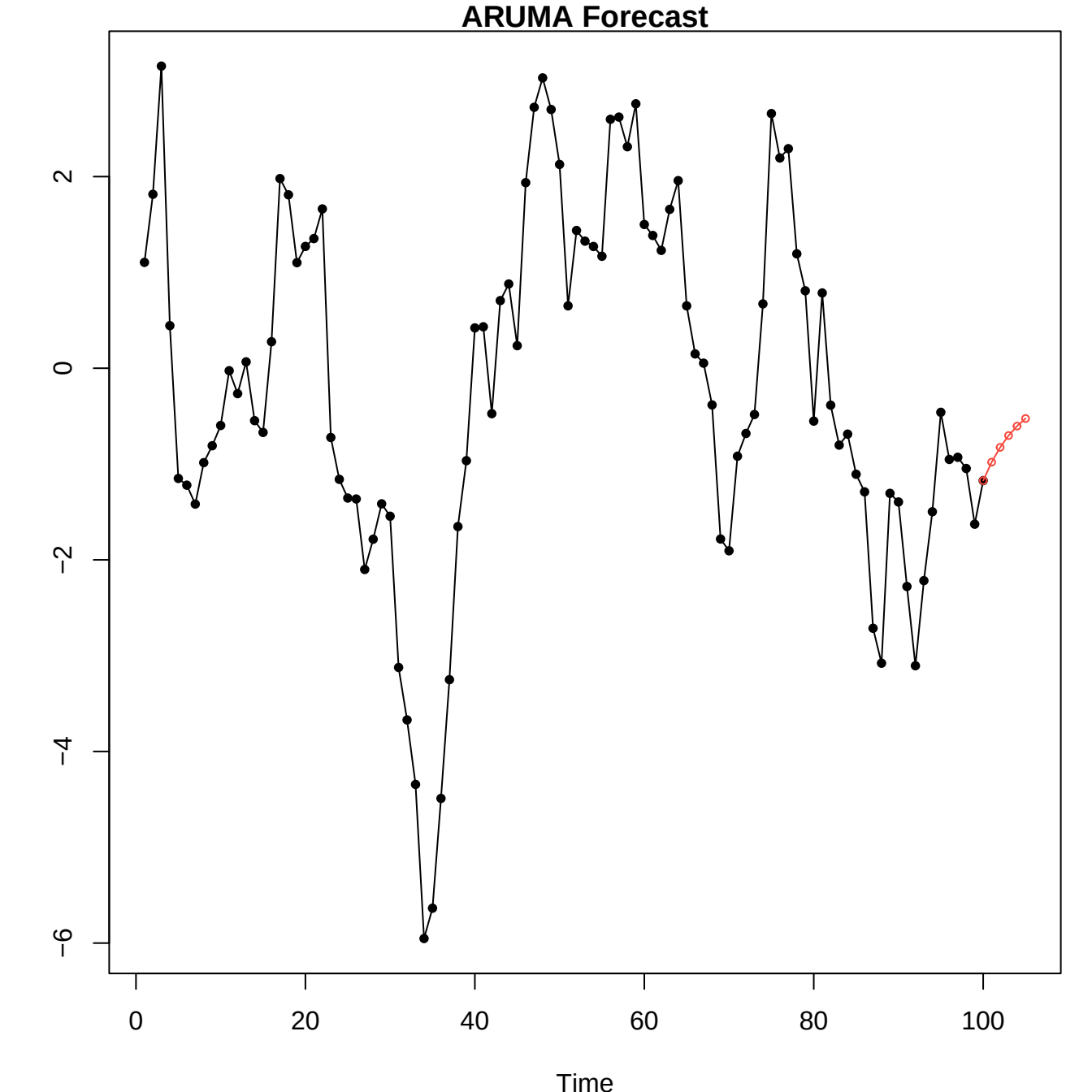

Original Series
2
1
0
−1
−2
0
20
40
60
80
100
Filtered Series
2
1
0
−1
−2
0
20
40
60
80
100
Time

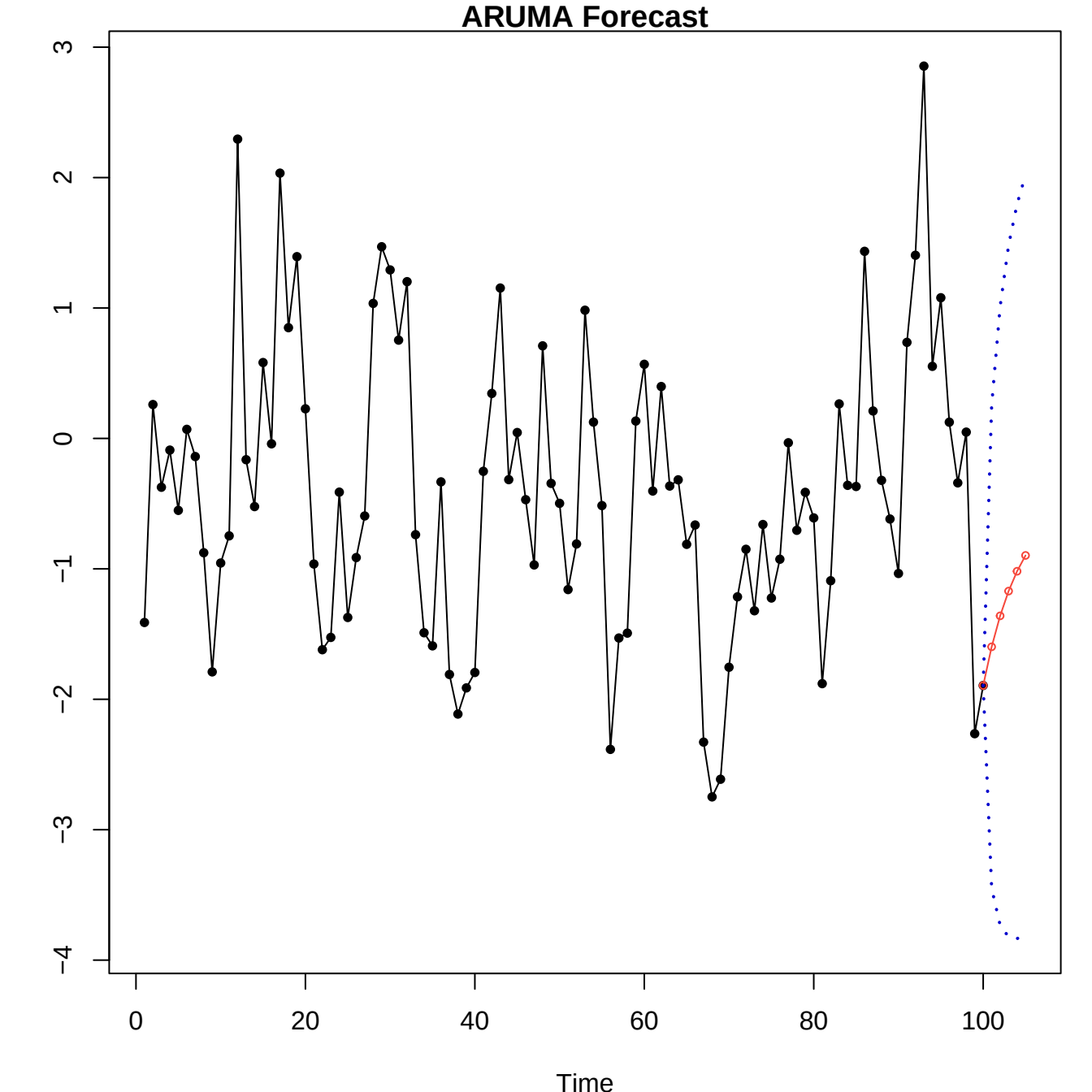

10
8
6
4
2
0
−2
0
20
40
60
80
100

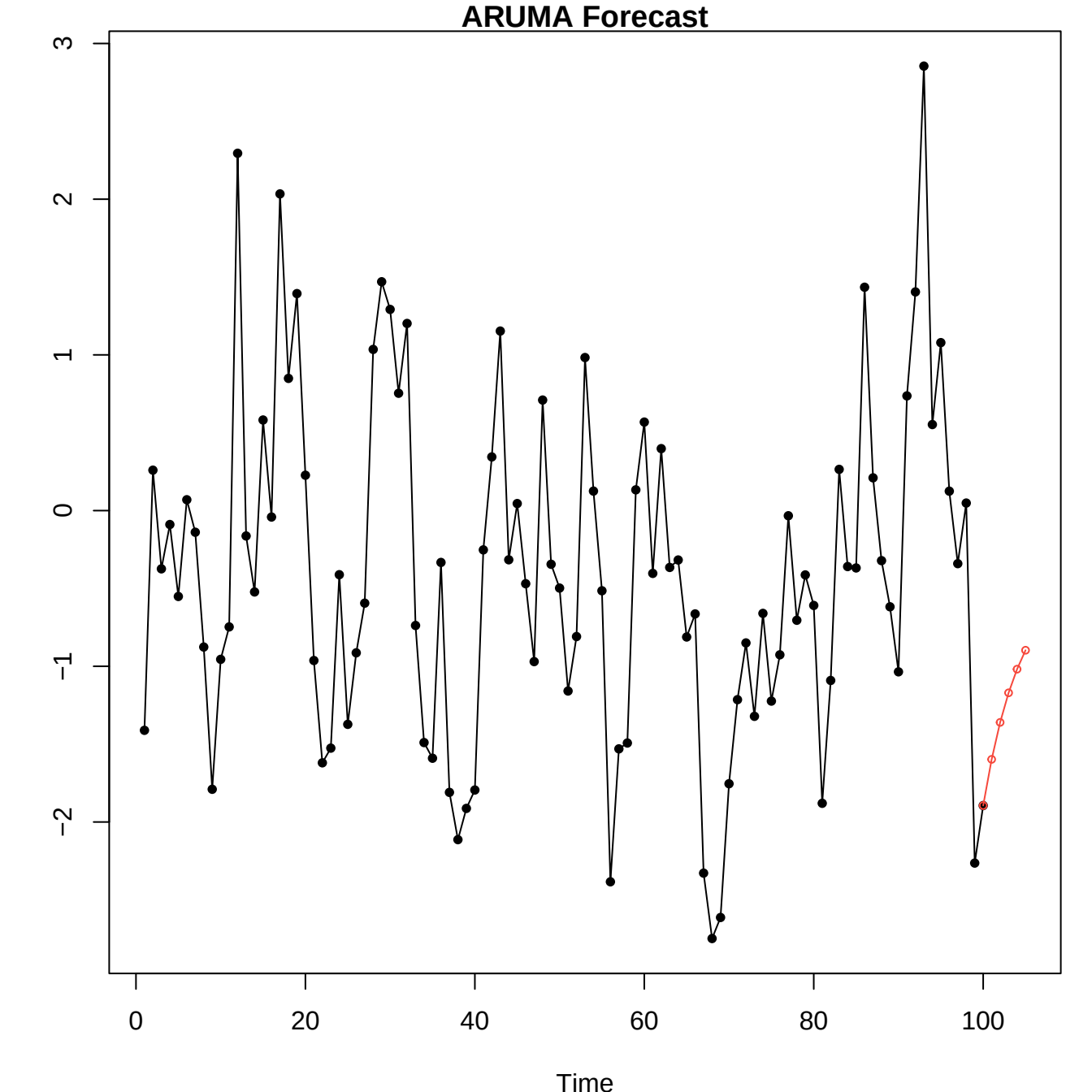

10
8
6
4
2
0
−2
0
10
20
30
40
50

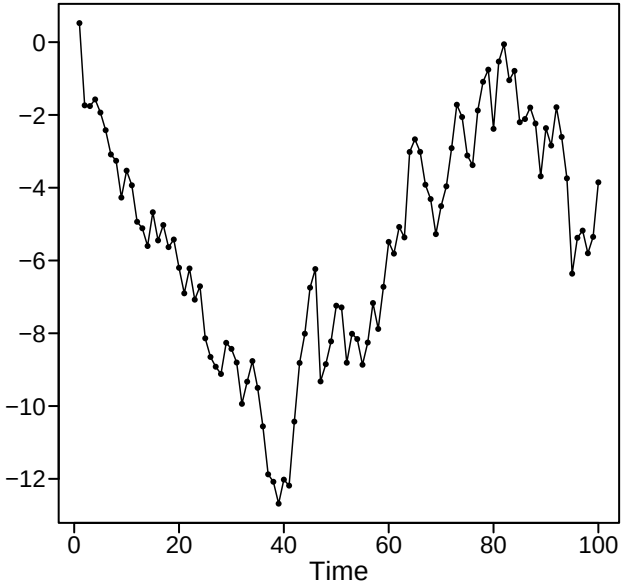

0
−2
−4
−6
−8
−10
−12
0
20
40
60
80


ARUMA Forecast
2
0
−2
−4
−6
0
20
40
60
80
100
Time

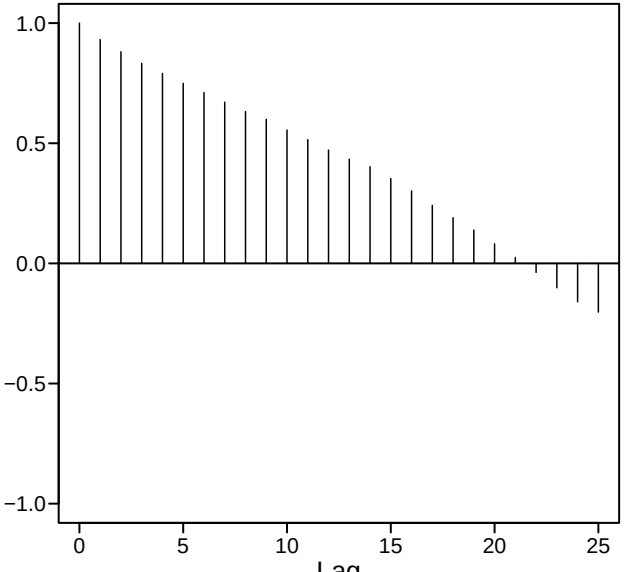

ARUMA Forecast
2
0
−2
−4
−6
0
20
40
60
80
100
Time


ARUMA Forecast
3
2
1
0
−1
−2
−3
−4
0
20
40
60
80
100
Time

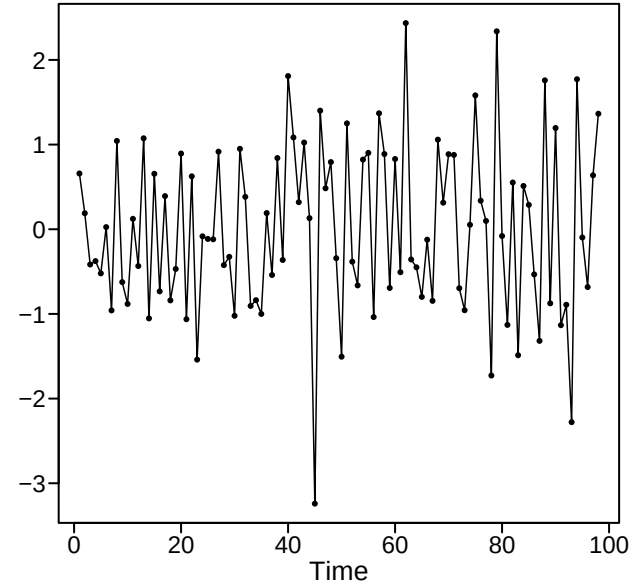

ARUMA Forecast
3
2
1
0
−1
−2
0
20
40
60
80
100
Time



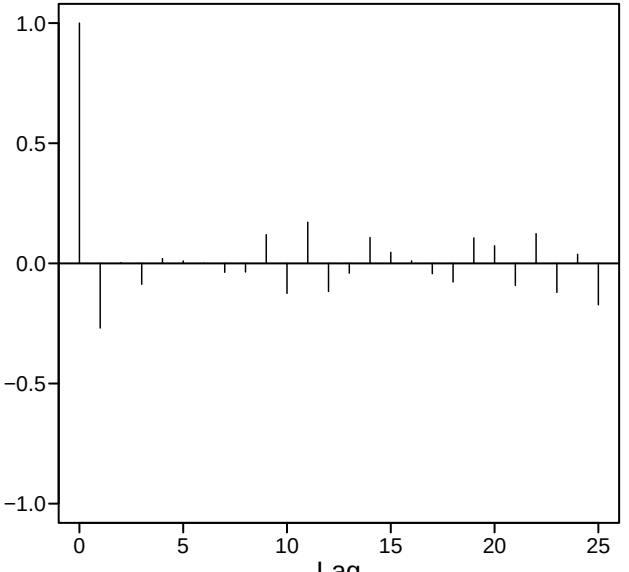
Realization



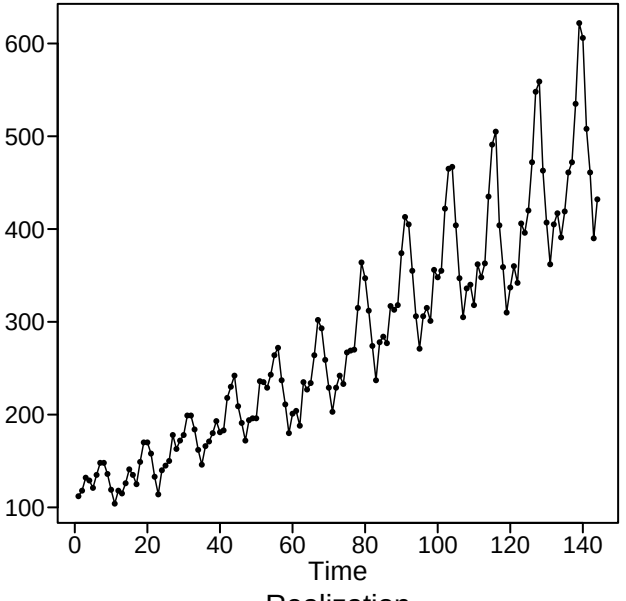
Sample Autocorrelations



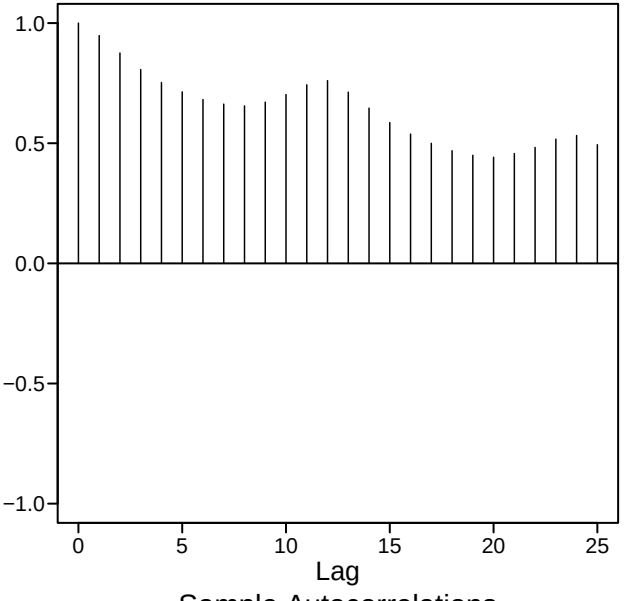
Transformed Realization



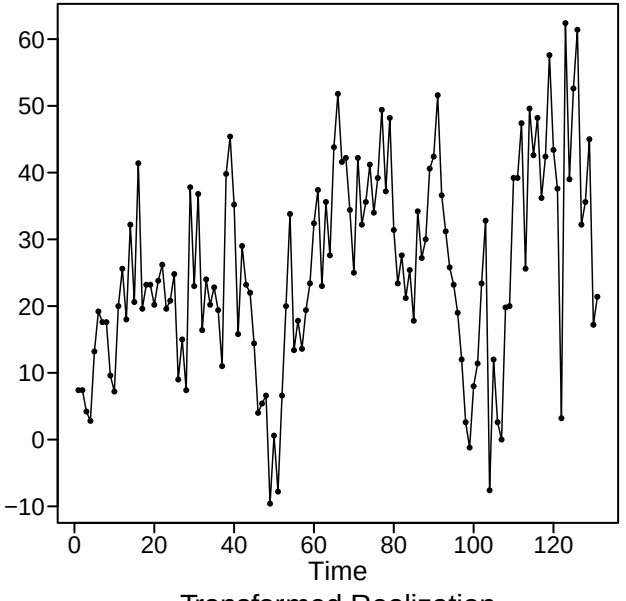
Sample Autocorrelations



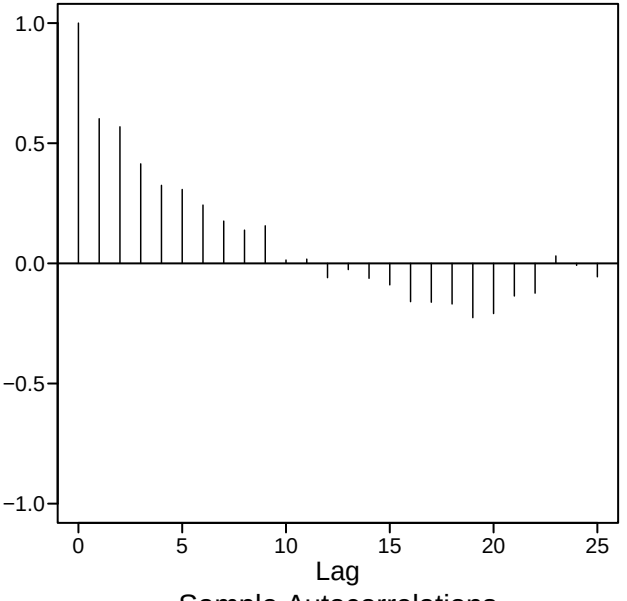
Realization



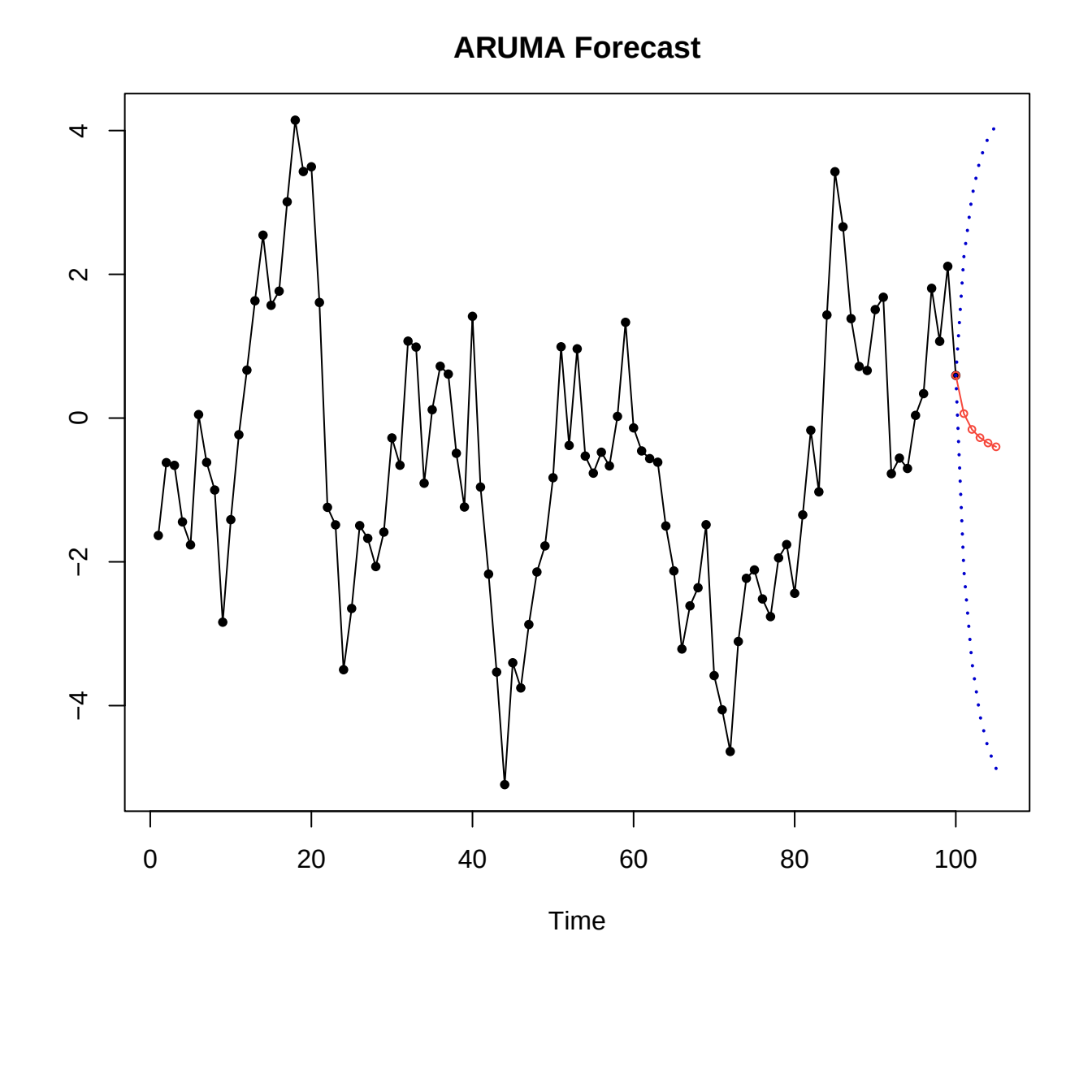
Sample Autocorrelations

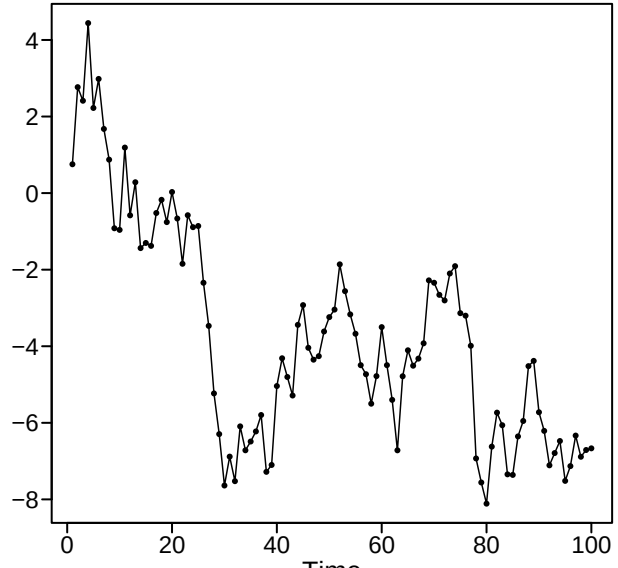


Transformed Realization

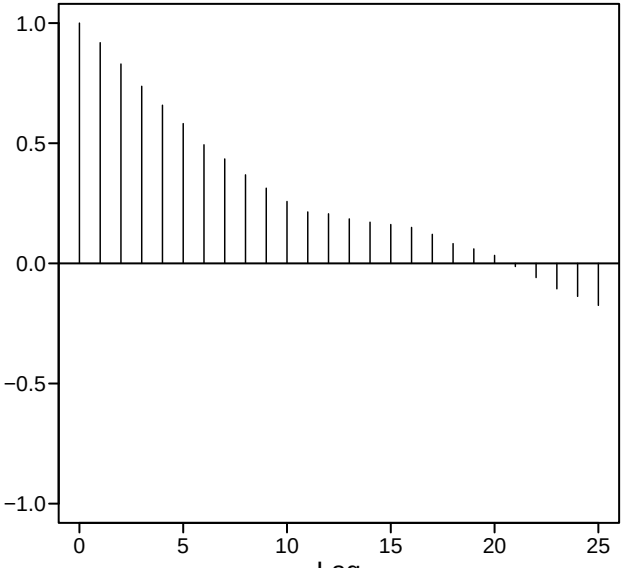


Sample Autocorrelations

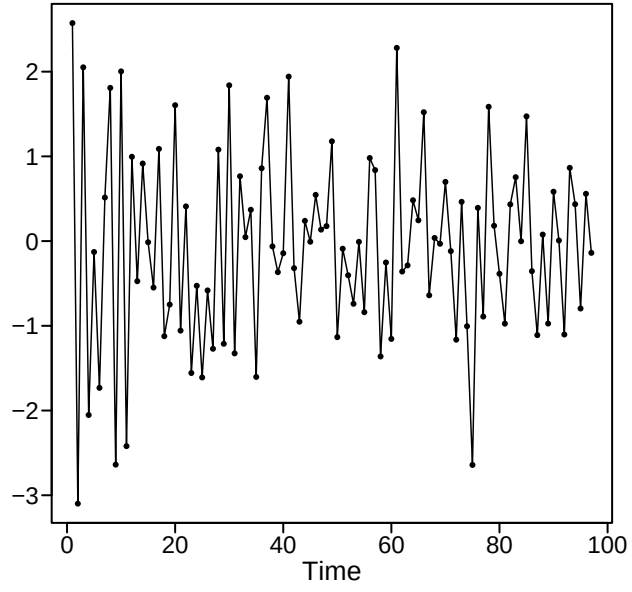

ARUMA Forecast
4
2
0
−2
−4
0
20
40
60
80
100
Time



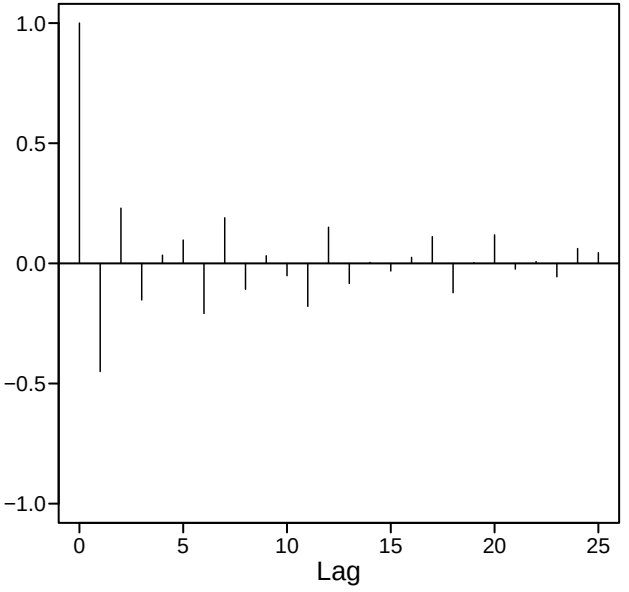
Realization



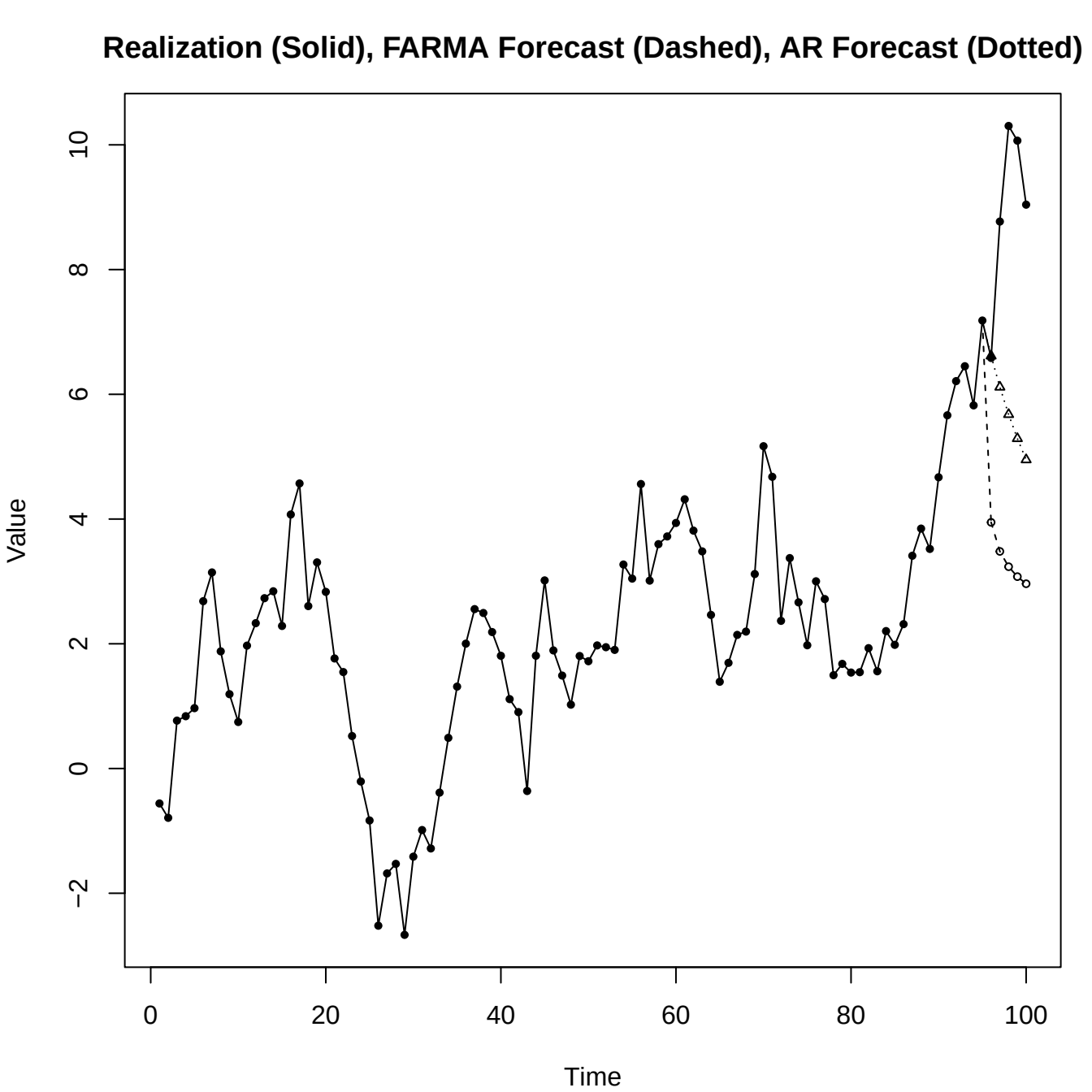
Sample Autocorrelations

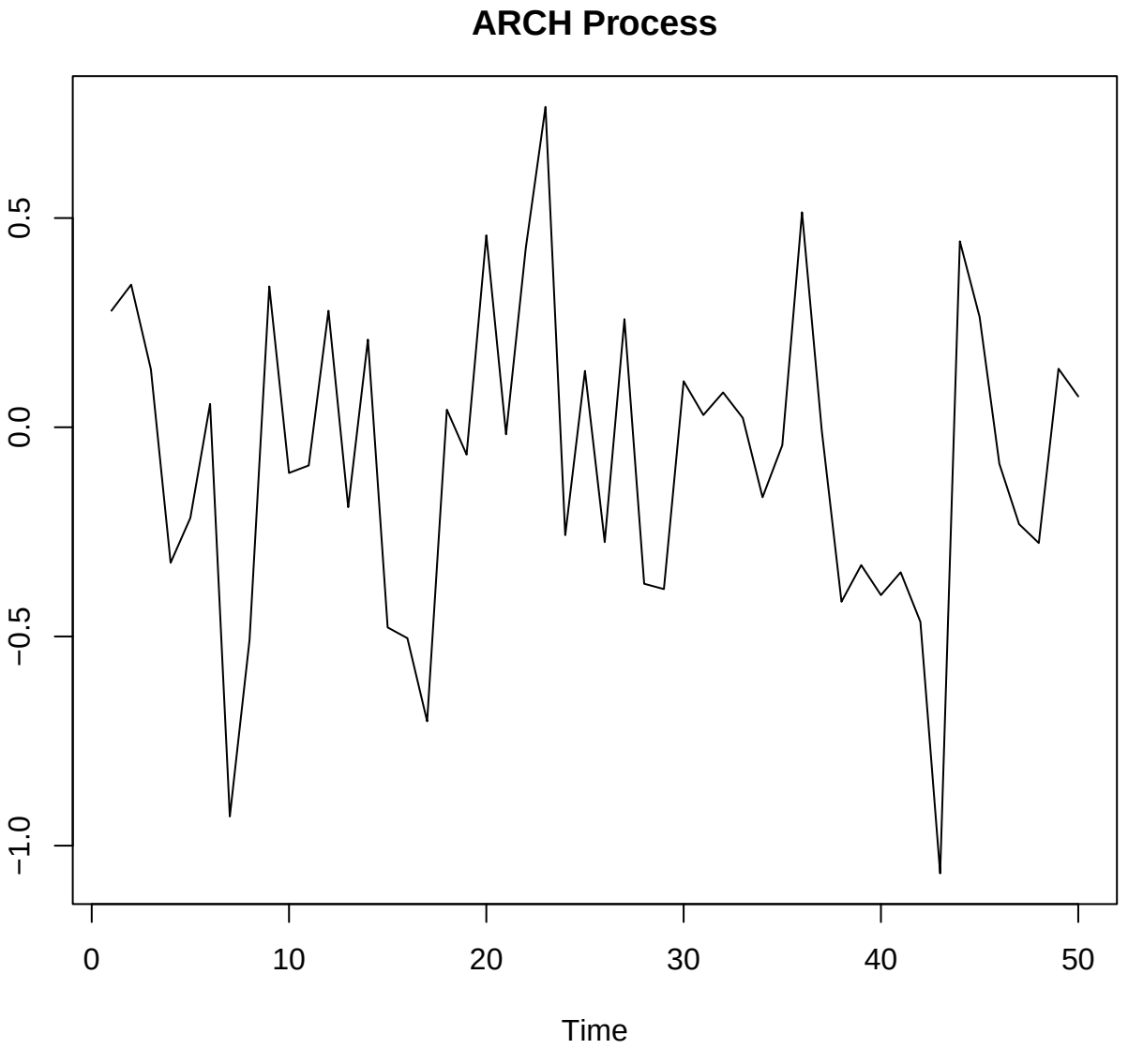


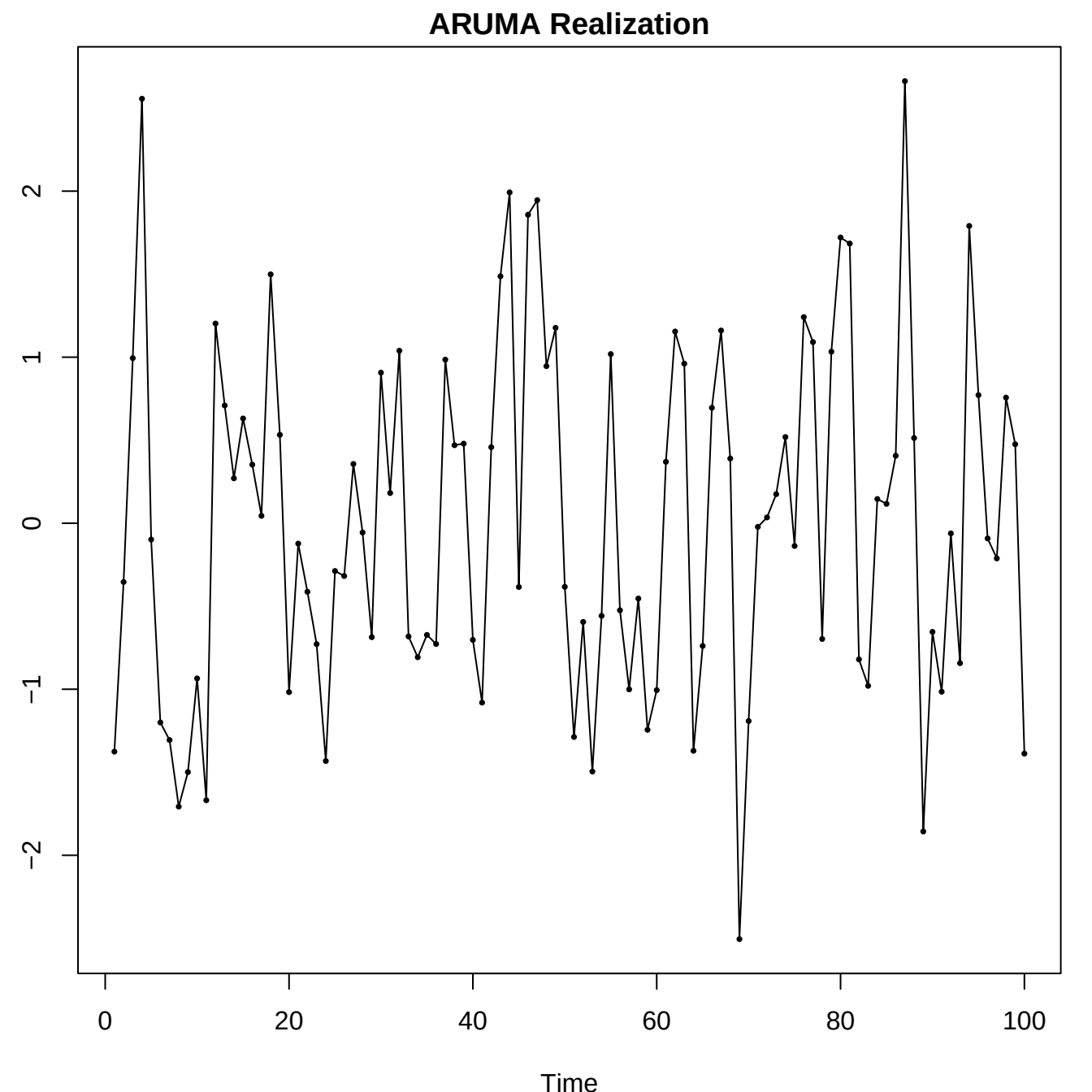
Transformed Realization

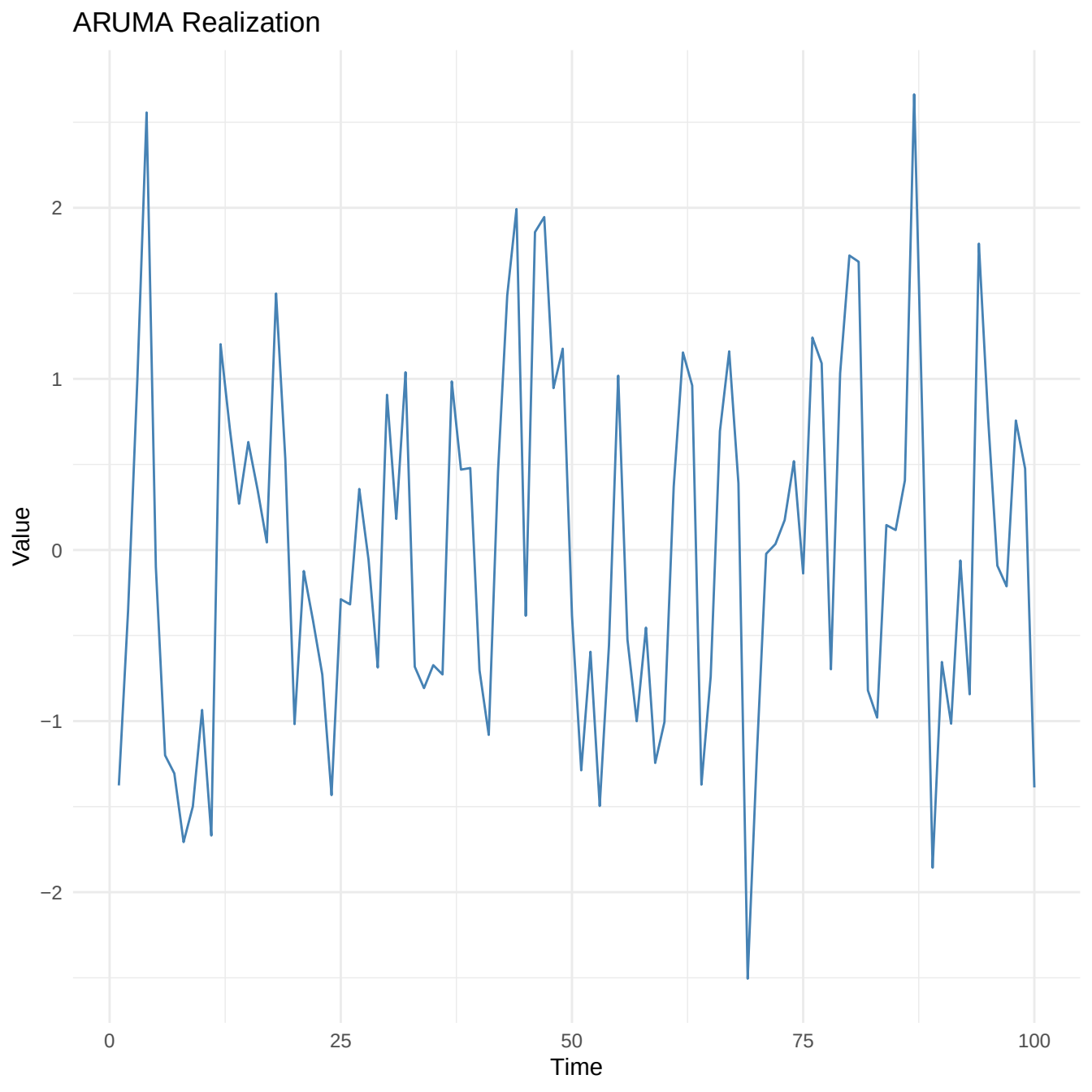


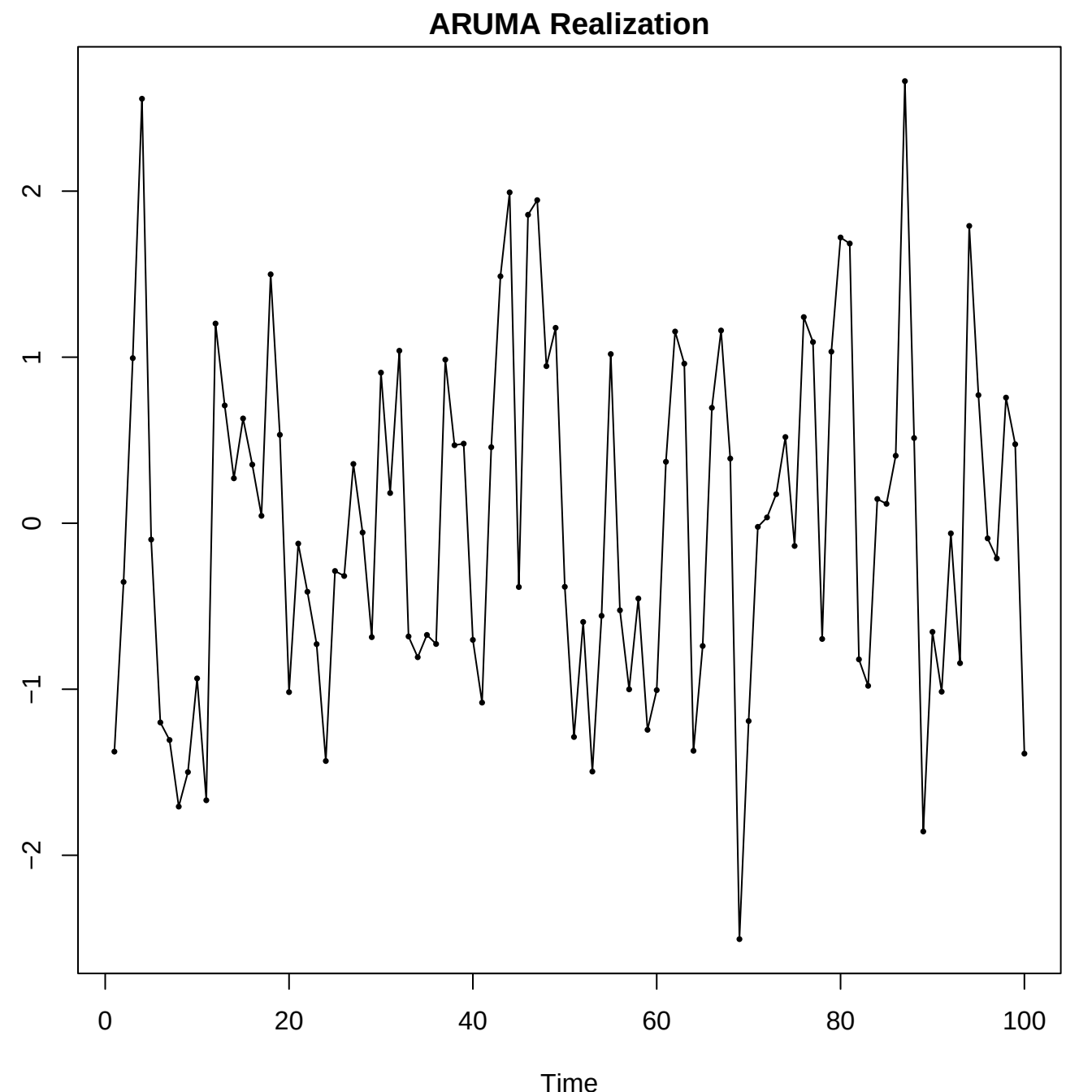
Sample Autocorrelations

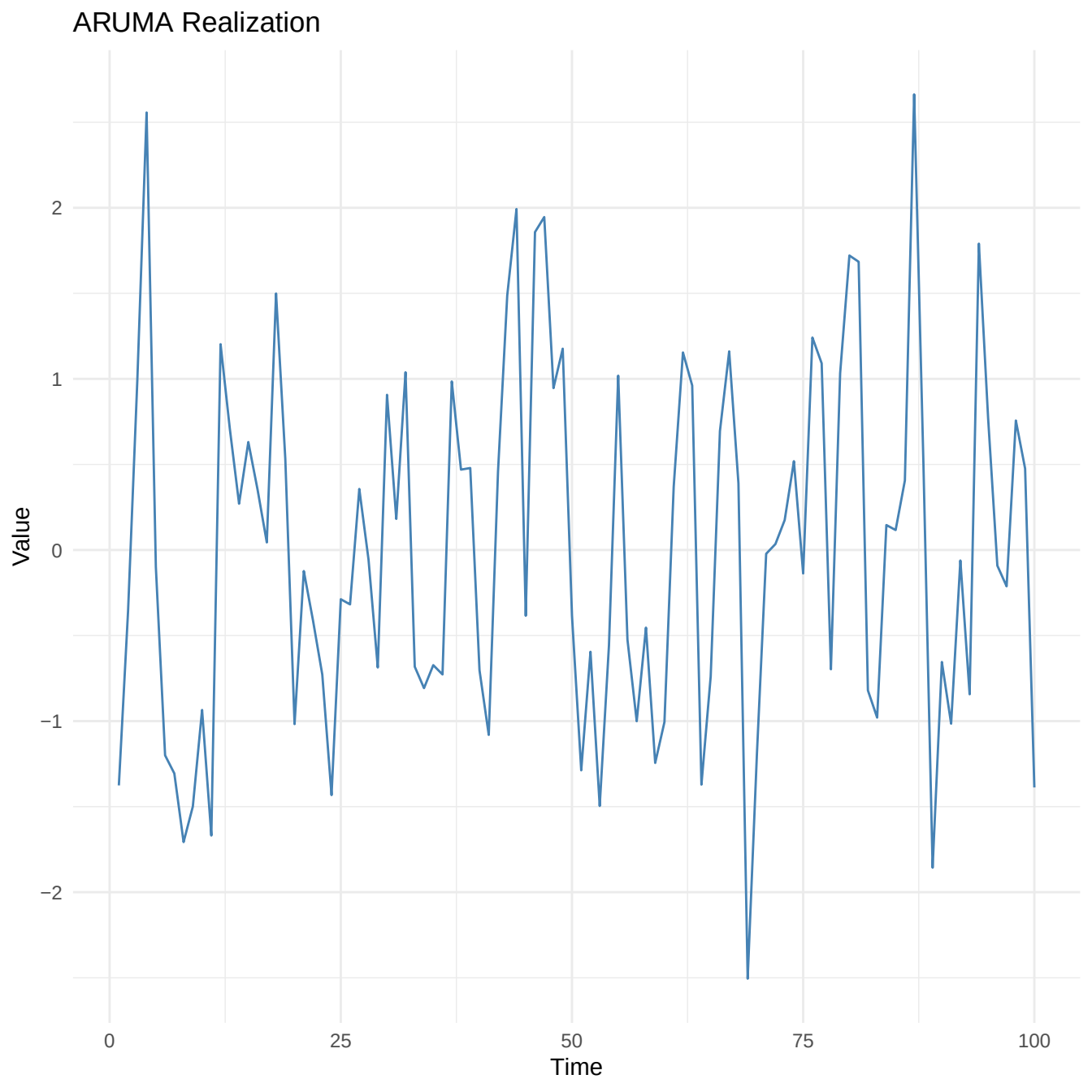

Realization (Solid), FARMA Forecast (Dashed), AR Forecast (Dotted)
Value
10
8
6
4
2
0
−2
0
20
40
60
80
100
Time

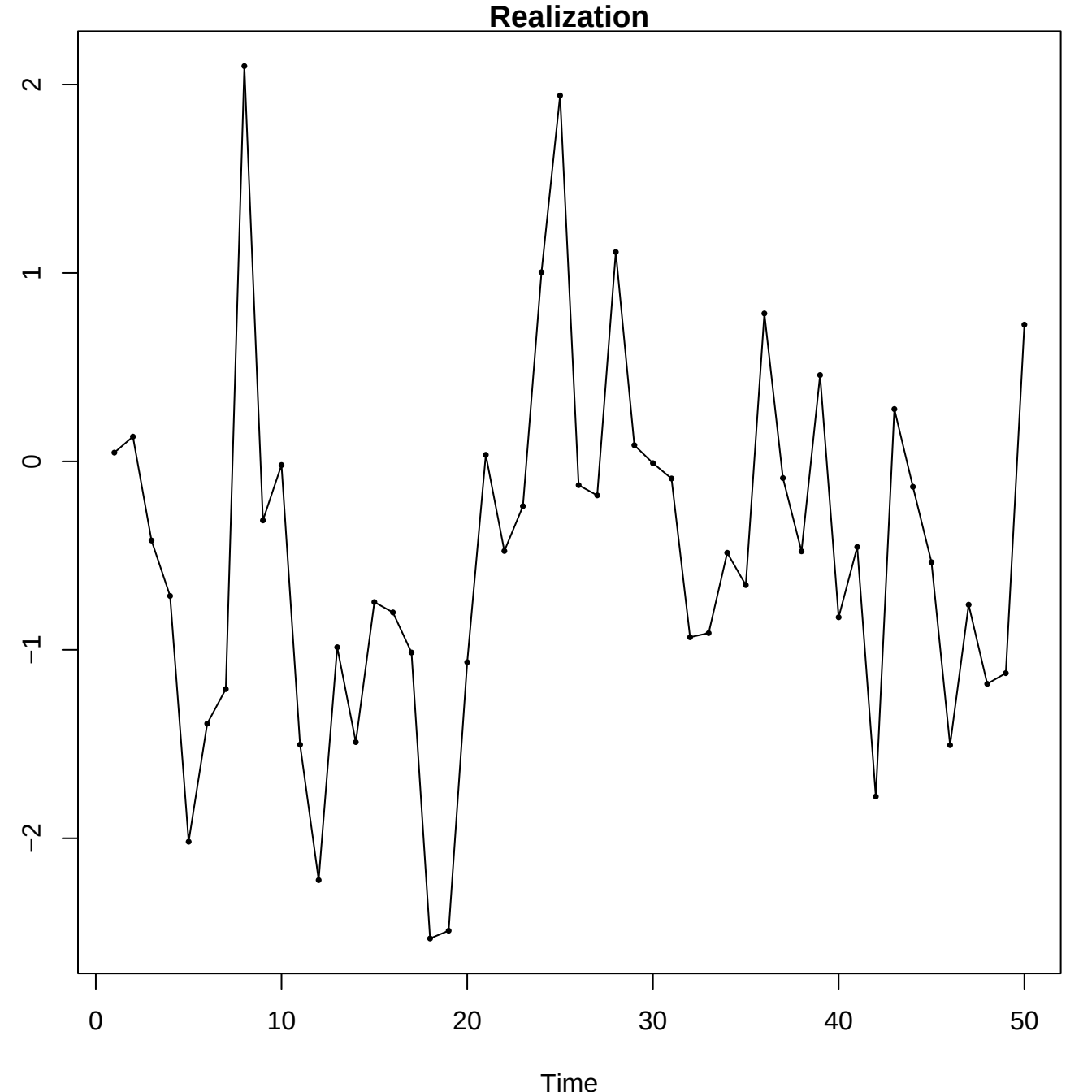

ARCH Process
0.5
0.0
−0.5
−1.0
0
10
20
30
40
50
Time

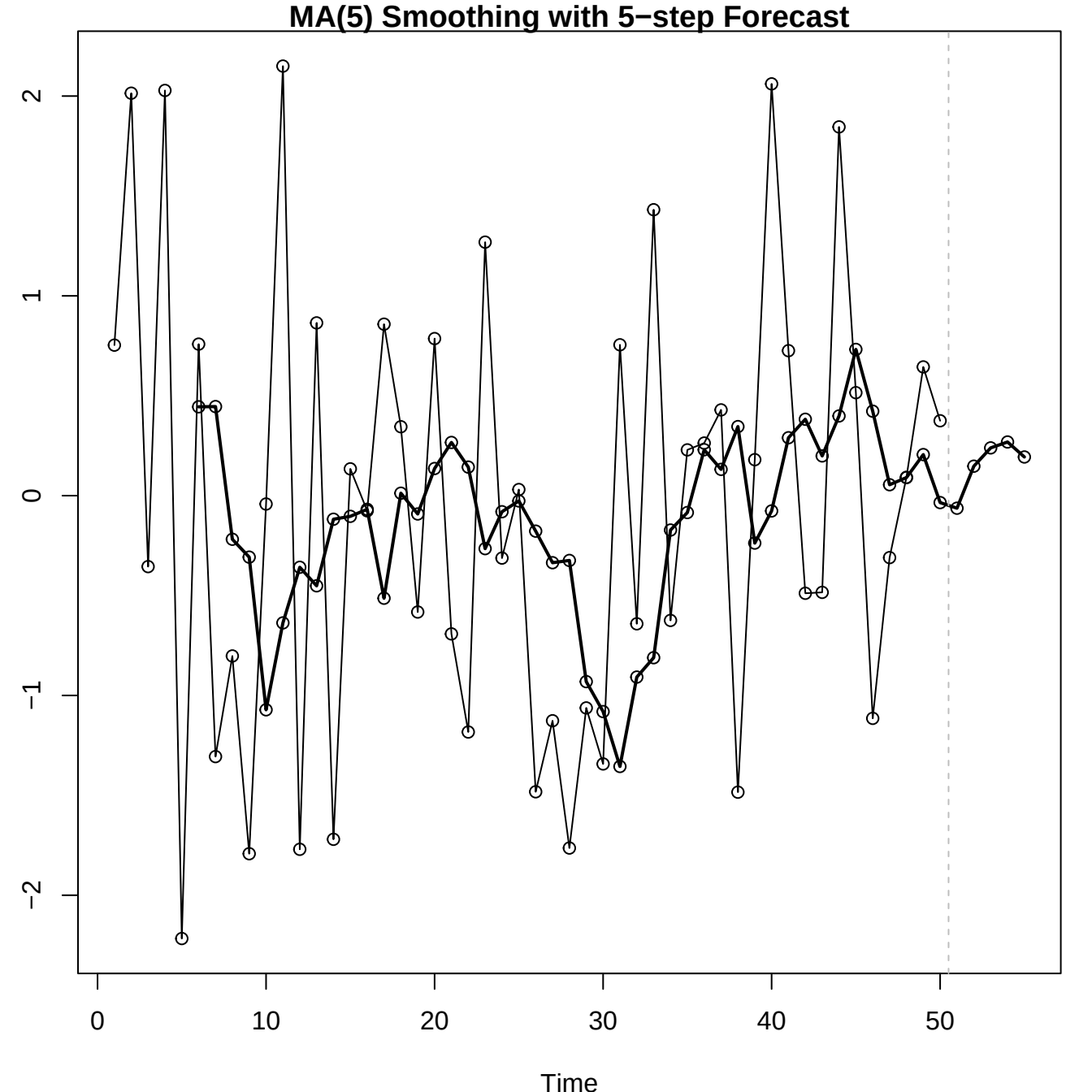

ARUMA Realization
2
1
0
−1
−2
0
20
40
60
80
100
Time

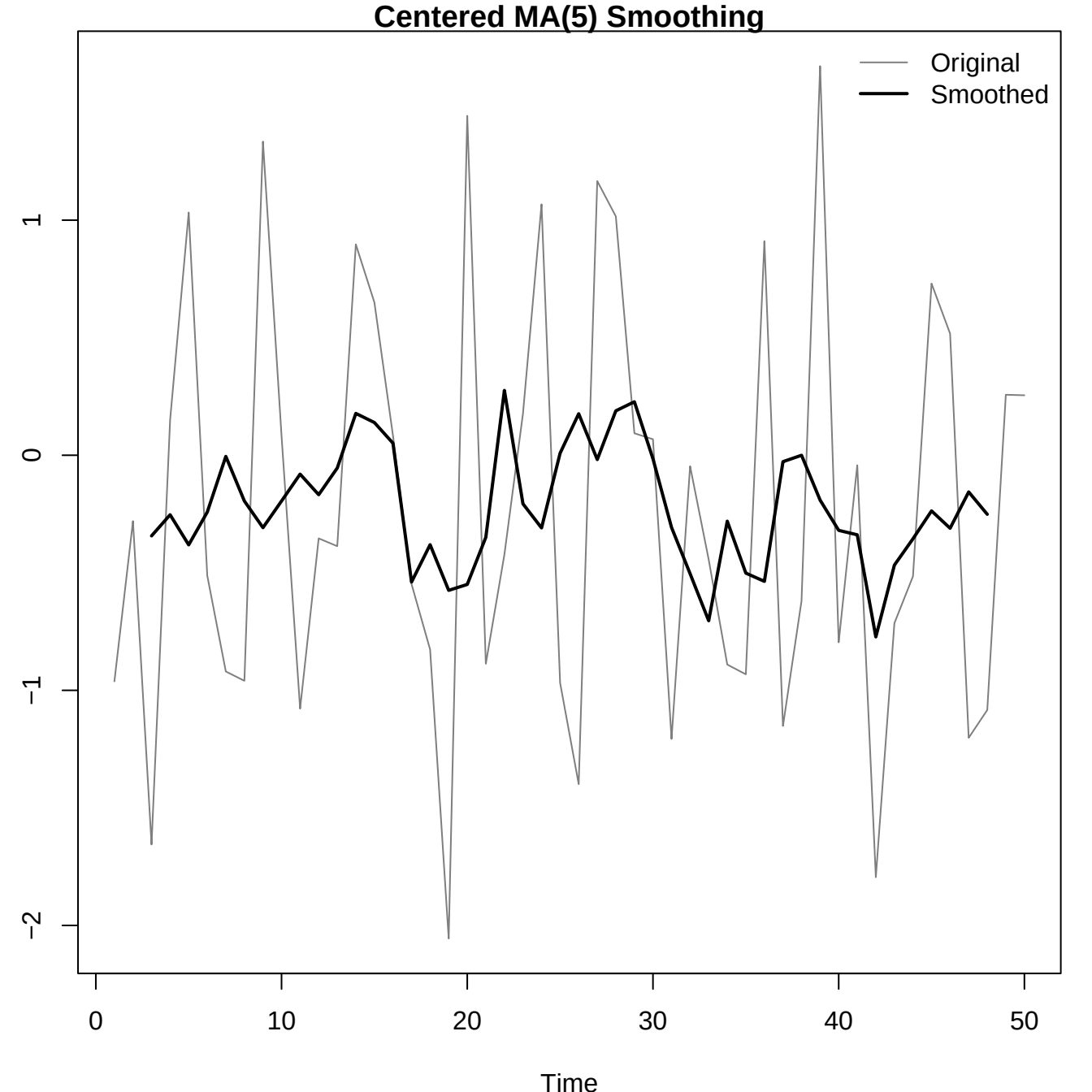

ARUMA Realization
Value
Time
2
1
0
−1
−2
0
25
50
75
100

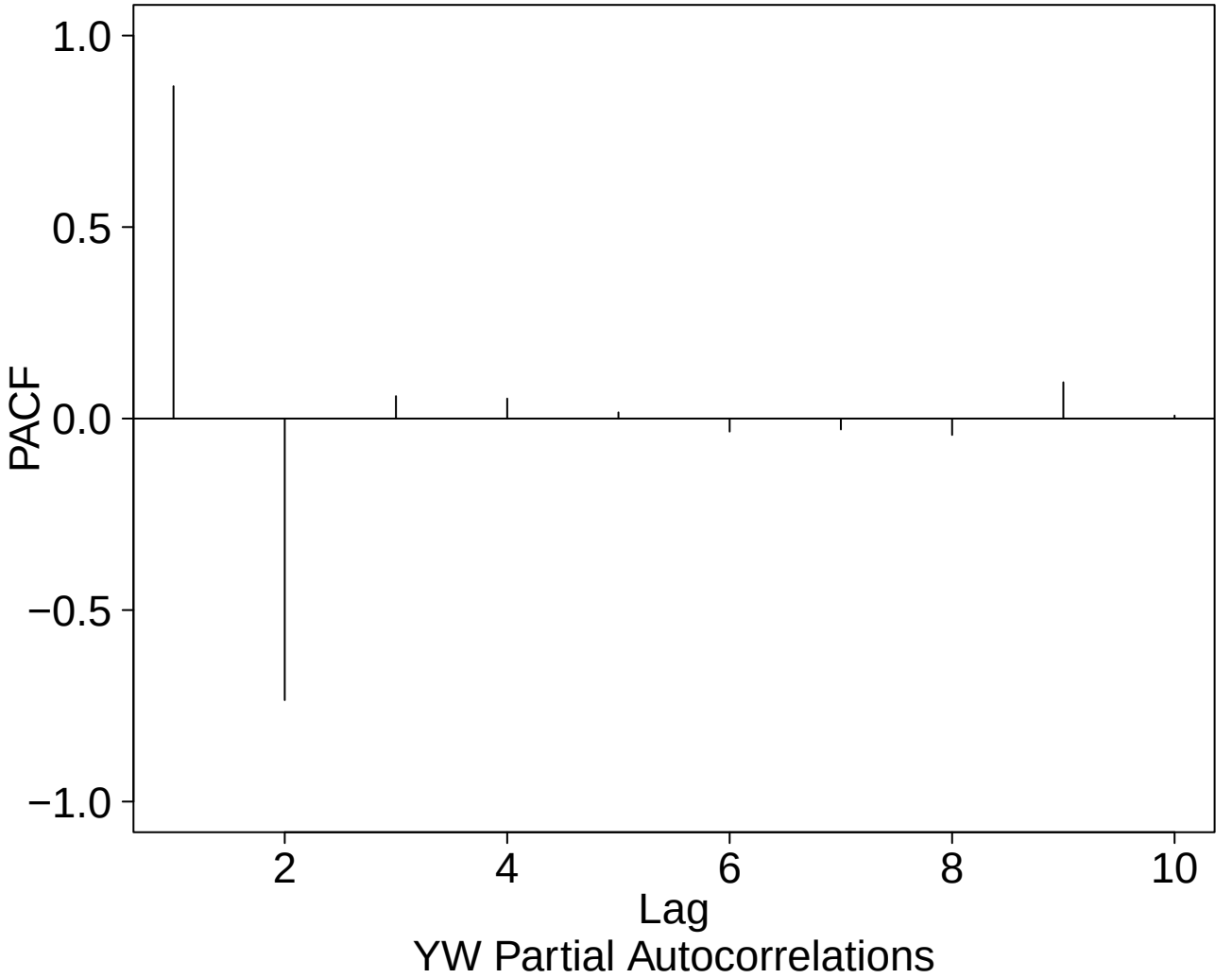

ARUMA Realization
2
1
0
−1
−2
0
20
40
60
80
100
Time

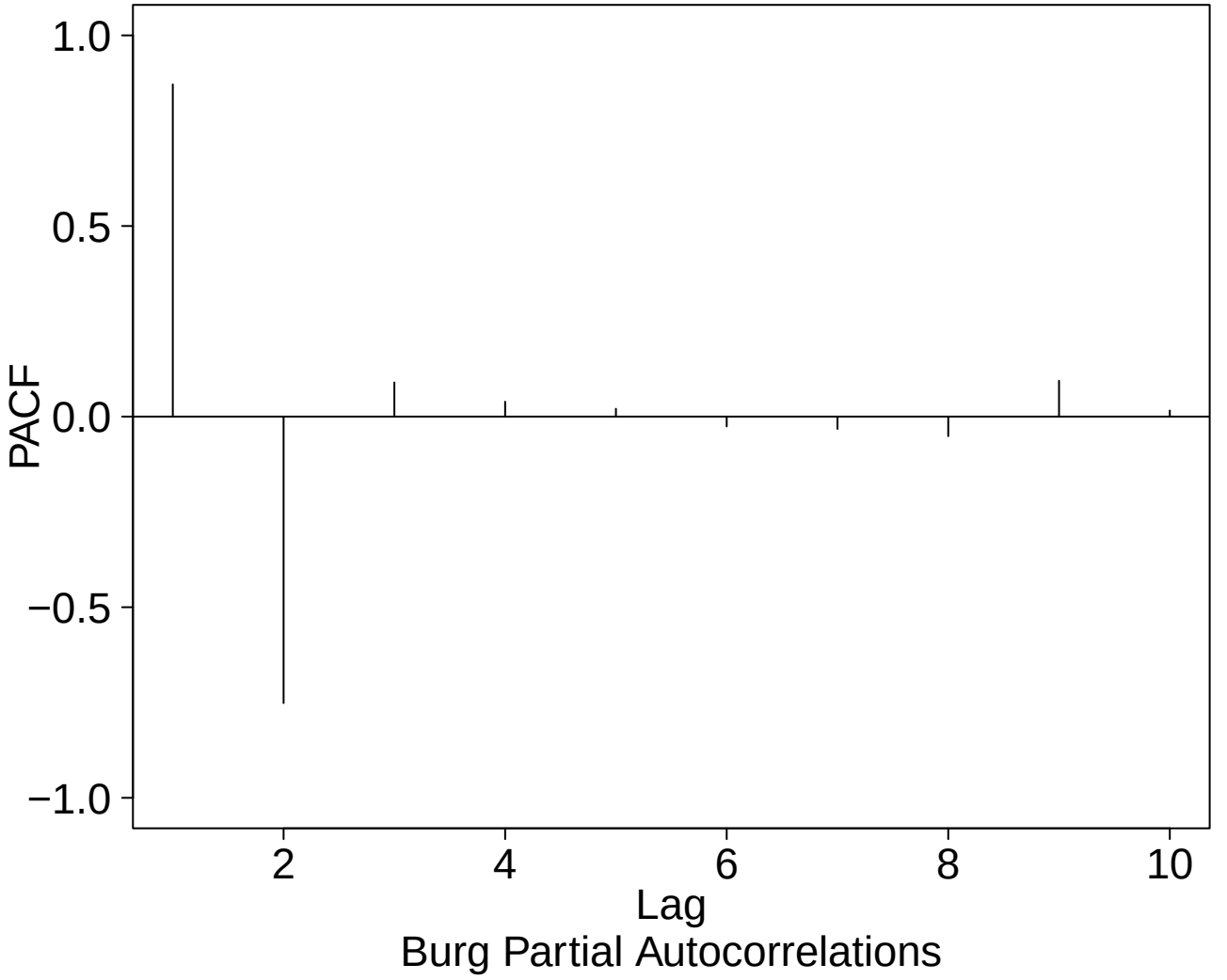

ARUMA Realization
Value
Time
2
1
0
−1
−2
0
25
50
75
100

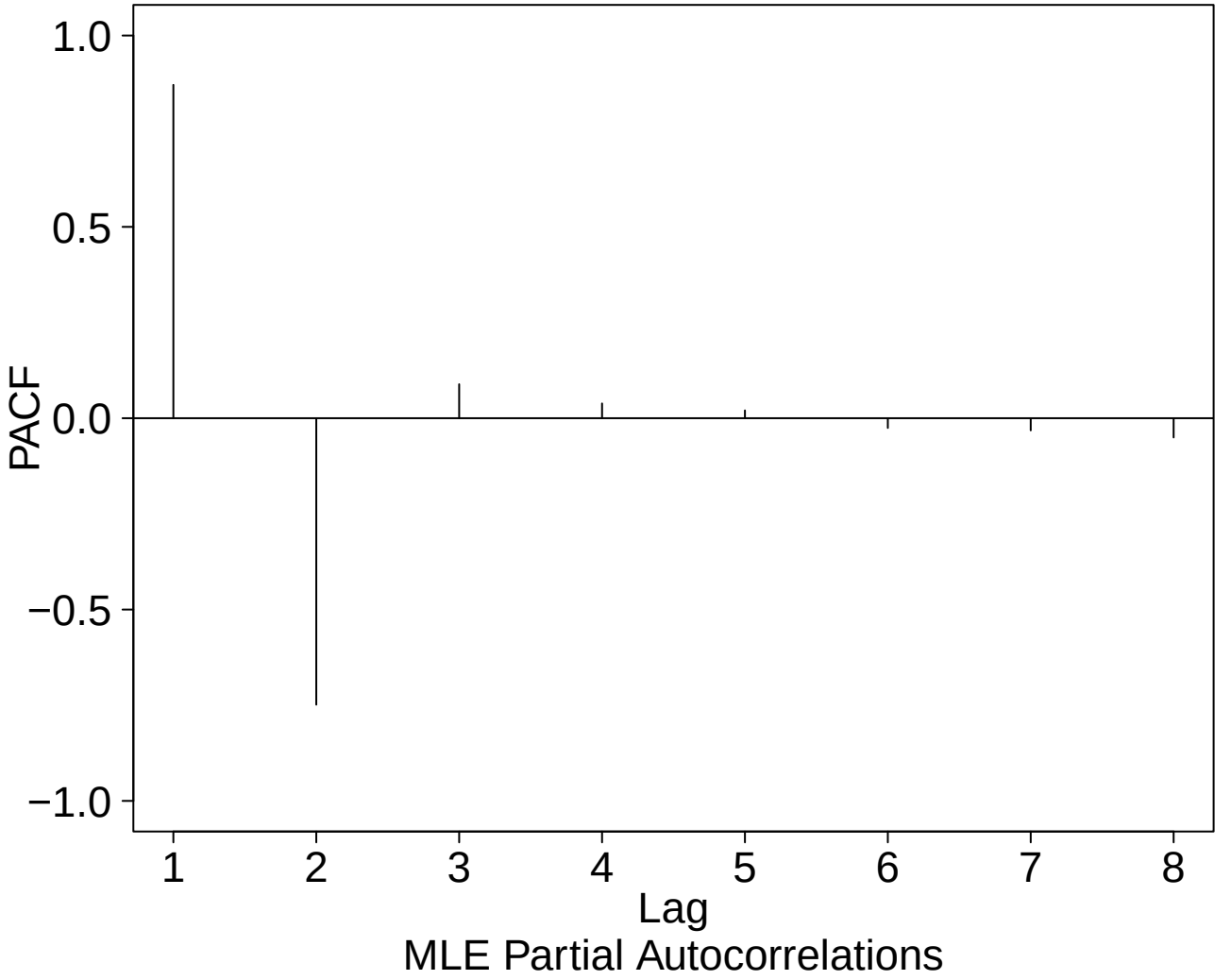

Realization
2
1
0
−1
−2
0
10
20
30
40
50
Time

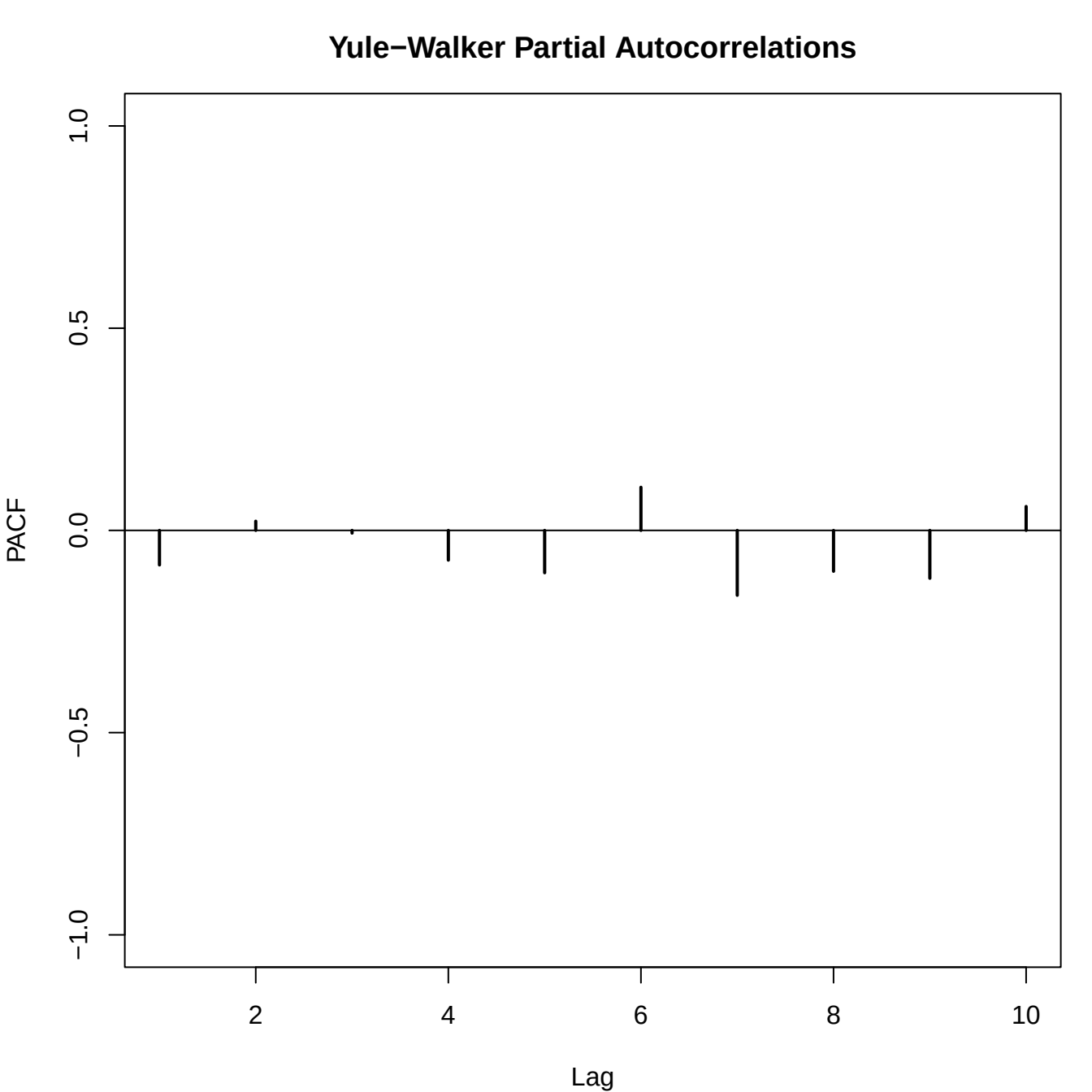

MA(5) Smoothing with 5−step Forecast
2
1
0
−1
−2
0
10
20
30
40
50
Time

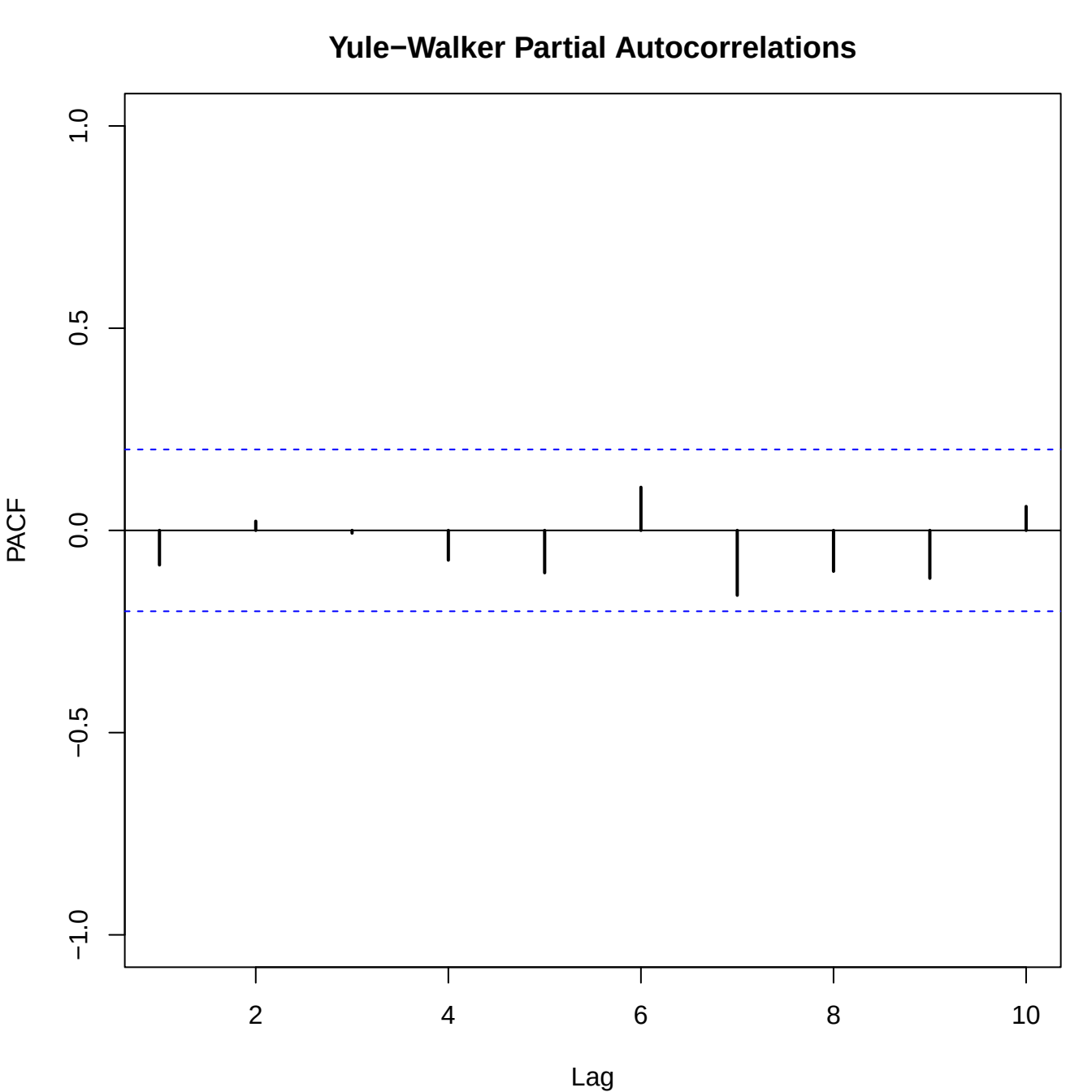

Centered MA(5) Smoothing
Original
Smoothed
1
0
−1
−2
0
10
20
30
40
50
Time

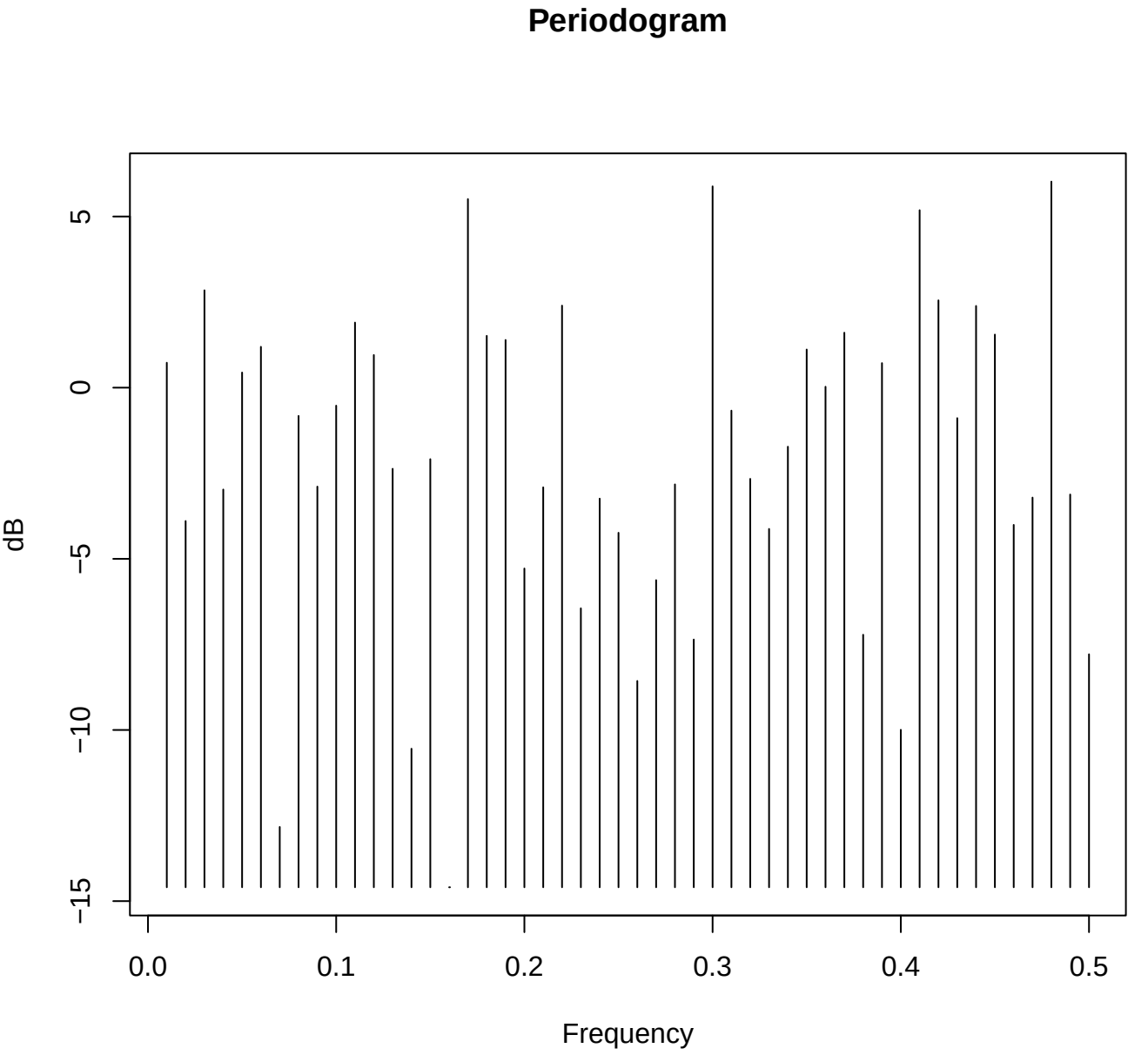

1.0
0.5
0.0
−0.5
−1.0
PACF
2
4
6
8
10
Lag
YW Partial Autocorrelations

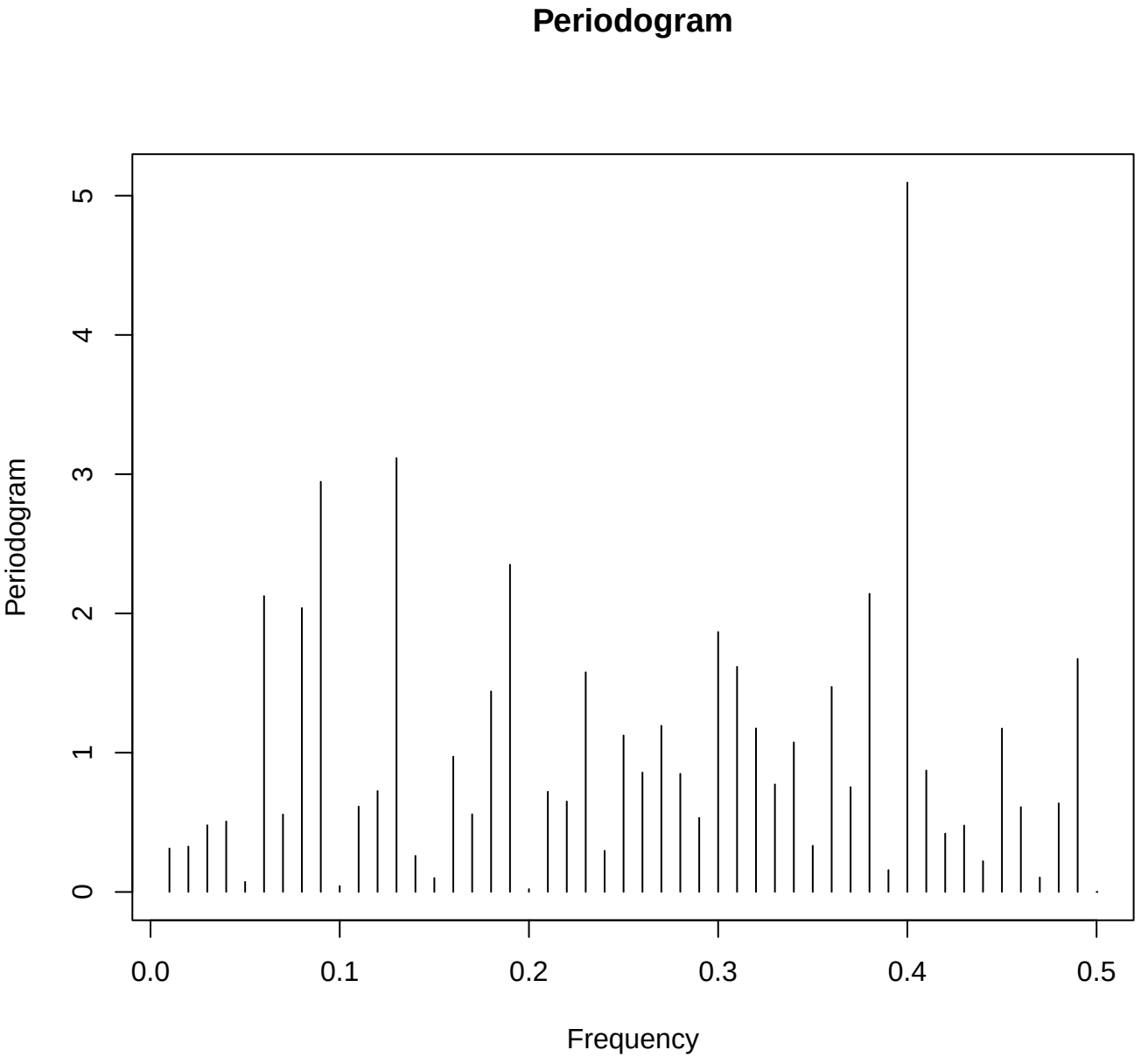

1.0
0.5
0.0
−0.5
−1.0
PACF
2
4
6
8
10
Lag
Burg Partial Autocorrelations

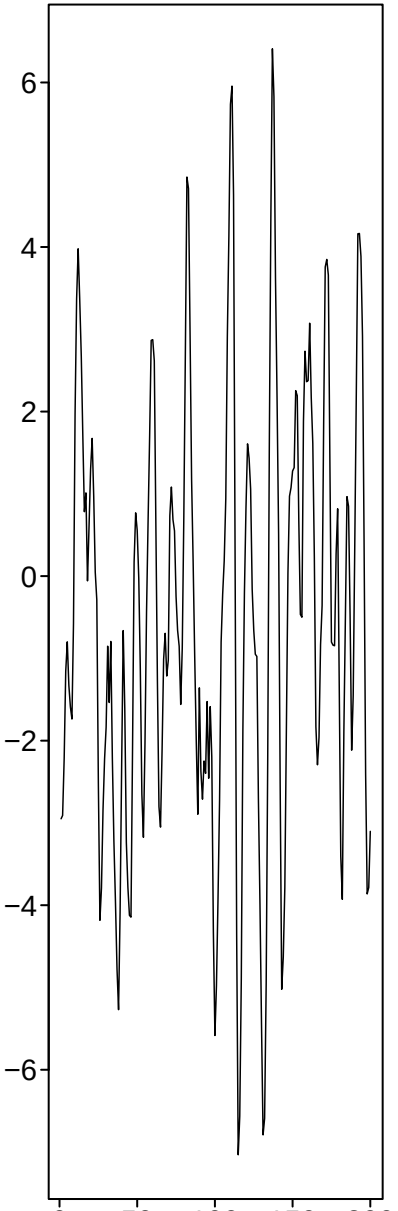

1.0
0.5
0.0
−0.5
−1.0
PACF
1
2
3
4
5
6
7
8
Lag
MLE Partial Autocorrelations

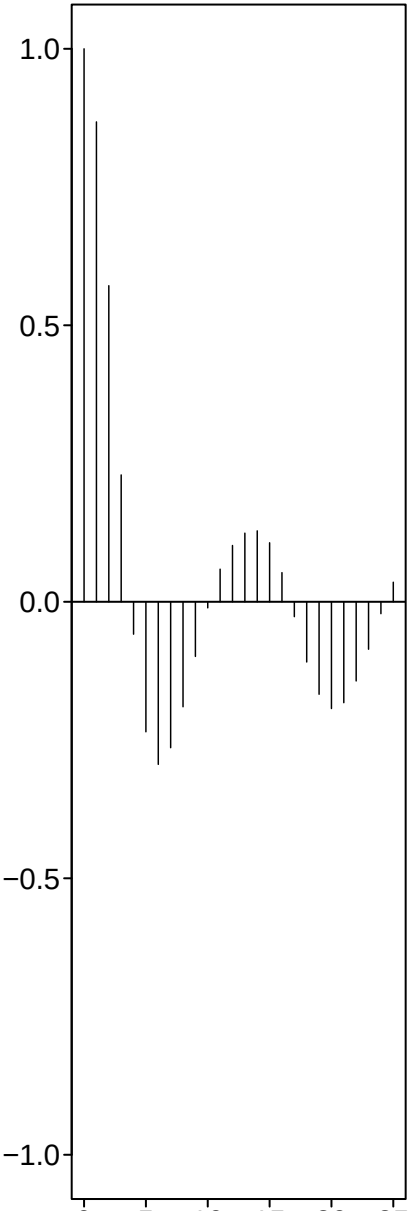

Yule−Walker Partial Autocorrelations
PACF
1.0
0.5
0.0
−0.5
−1.0
2
4
6
8
10
Lag

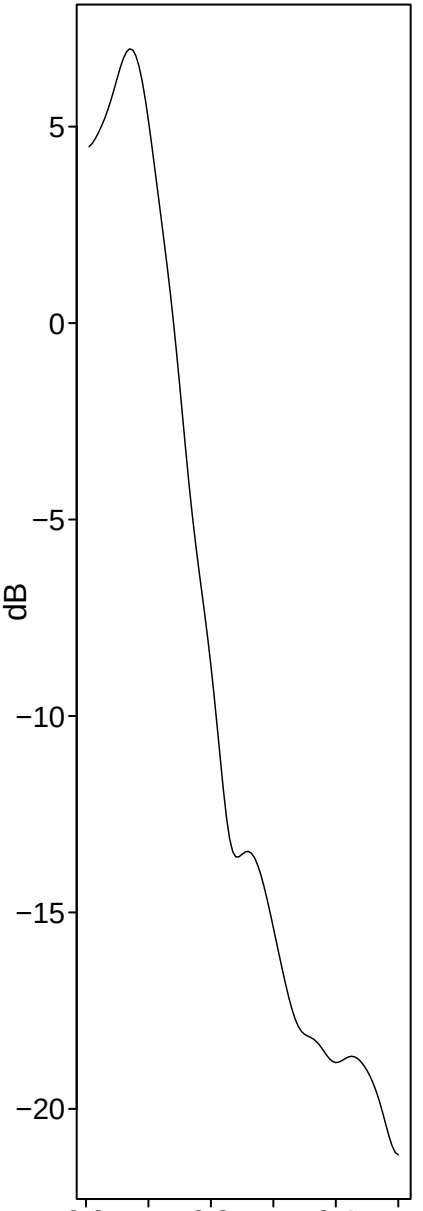

Yule−Walker Partial Autocorrelations
PACF
1.0
0.5
0.0
−0.5
−1.0
2
4
6
8
10
Lag

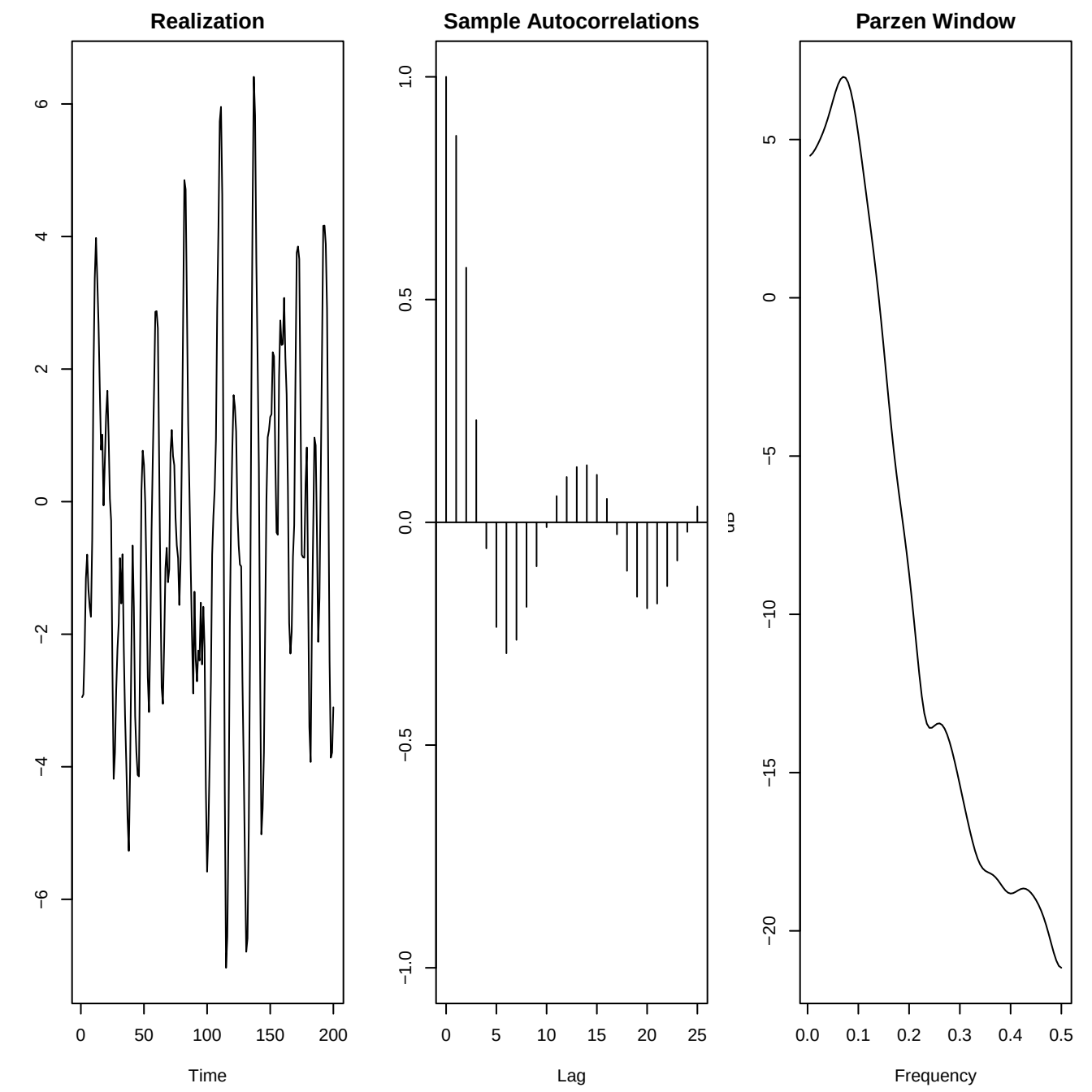

Periodogram
dB
5
0
−5
−10
−15
0.0
0.1
0.2
0.3
0.4
0.5
Frequency

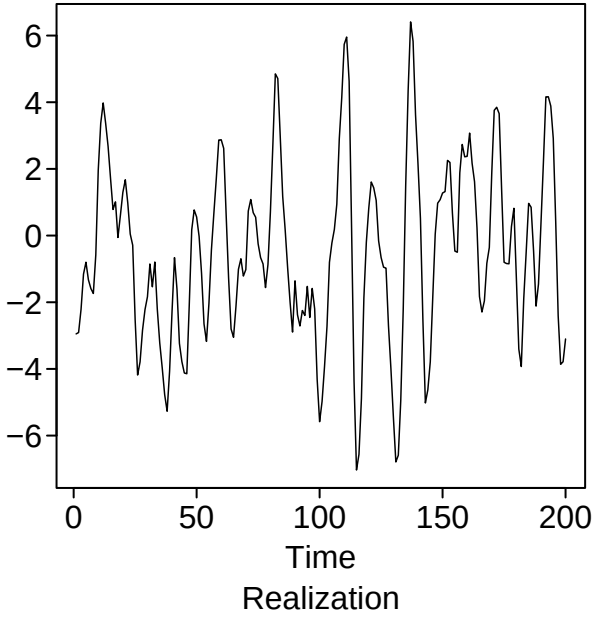

Periodogram
Periodogram
0
1
2
3
4
5
0.0
0.1
0.2
0.3
0.4
0.5
Frequency


6
4
2
0
−2
−4
−6
0
50
100
150
200
Time
Realization

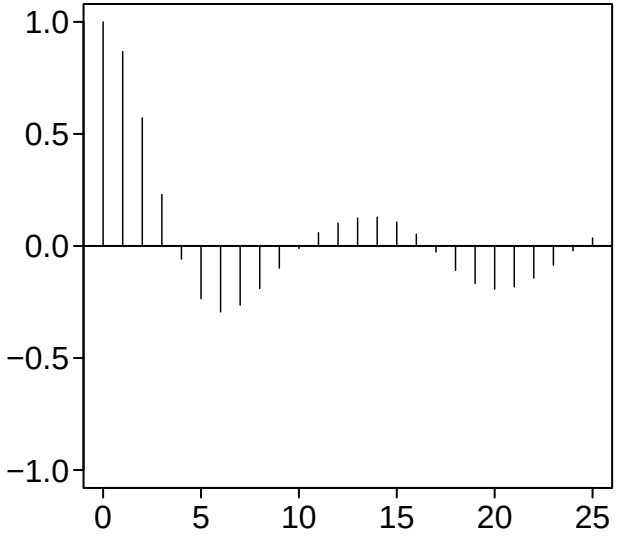

1.0
0.5
0.0
−0.5
−1.0
0
5
10
15
20
25
Lag
Sample Autocorrelations


5
0
−5
−10
−15
−20
dB
0.0
0.2
0.4
Frequency
Parzen Window

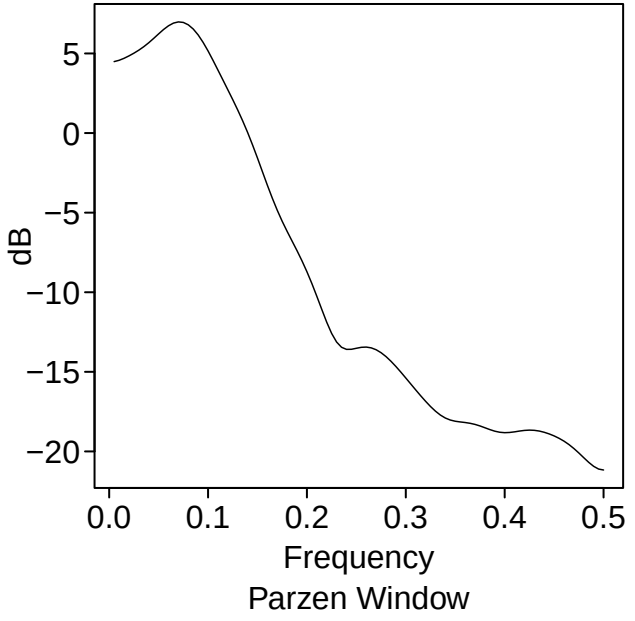

Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency



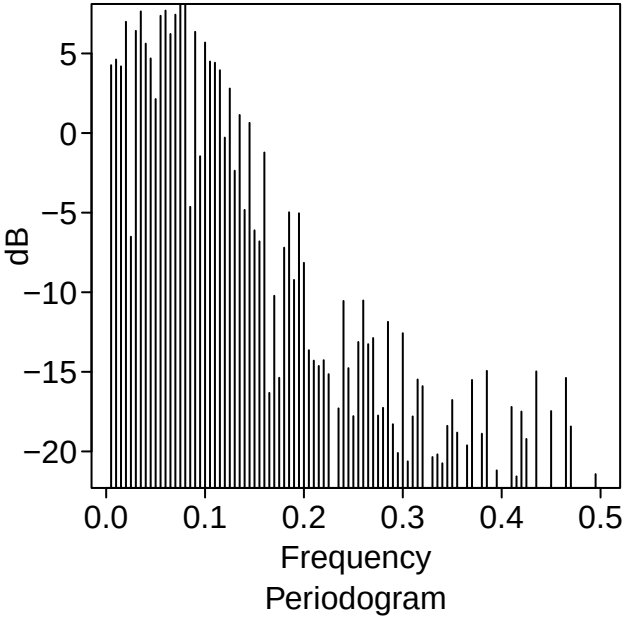
Realization



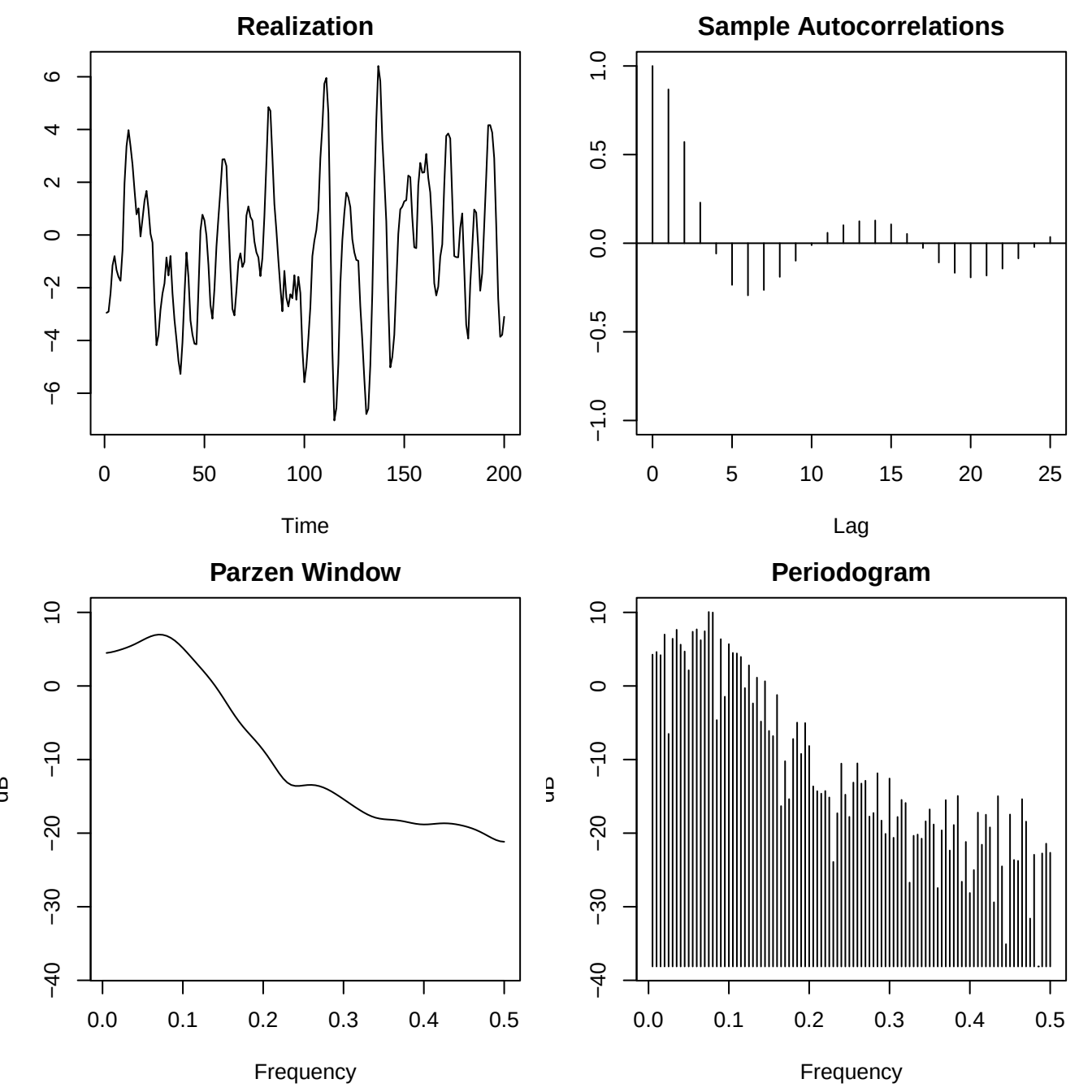
Sample Autocorrelations

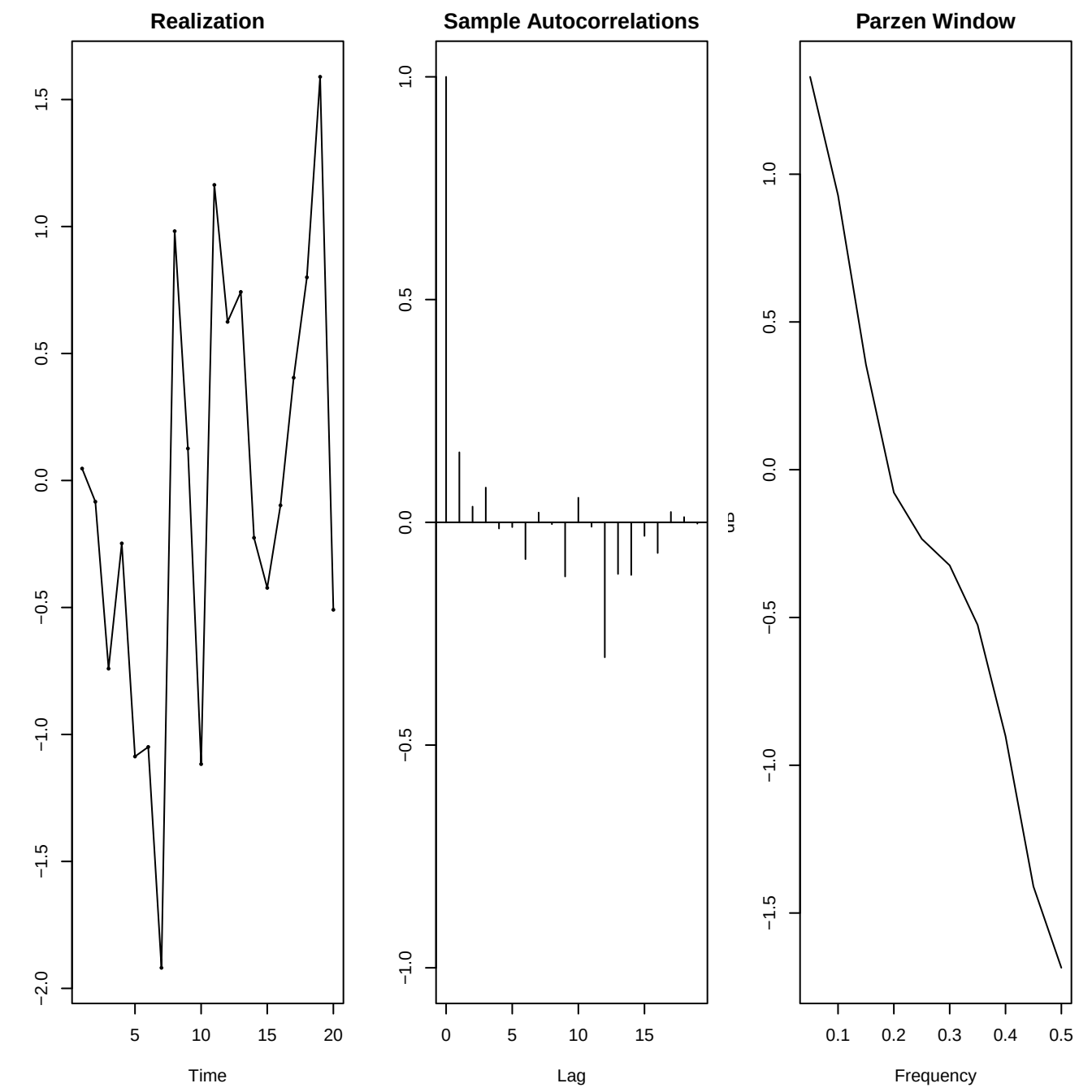


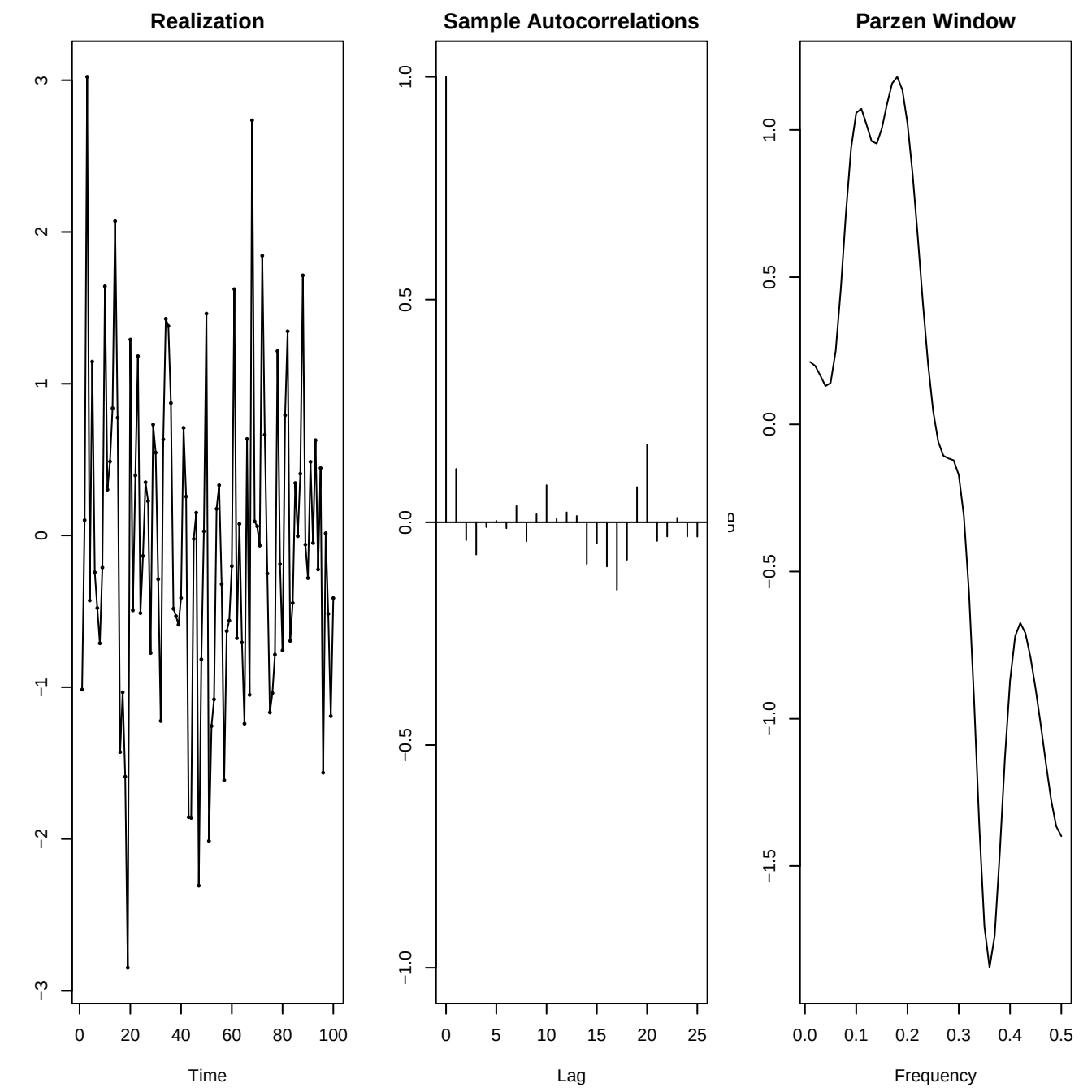
Parzen Window

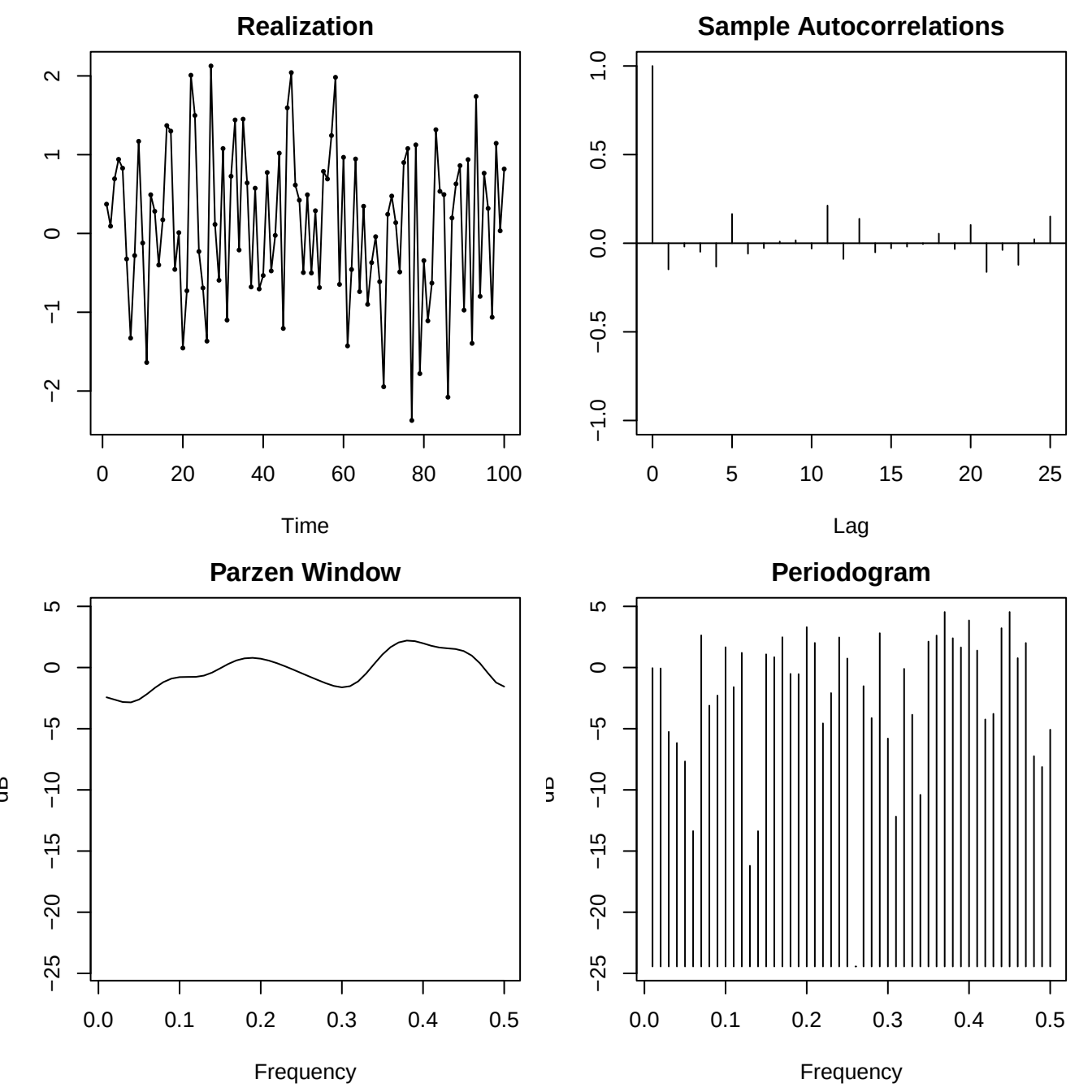


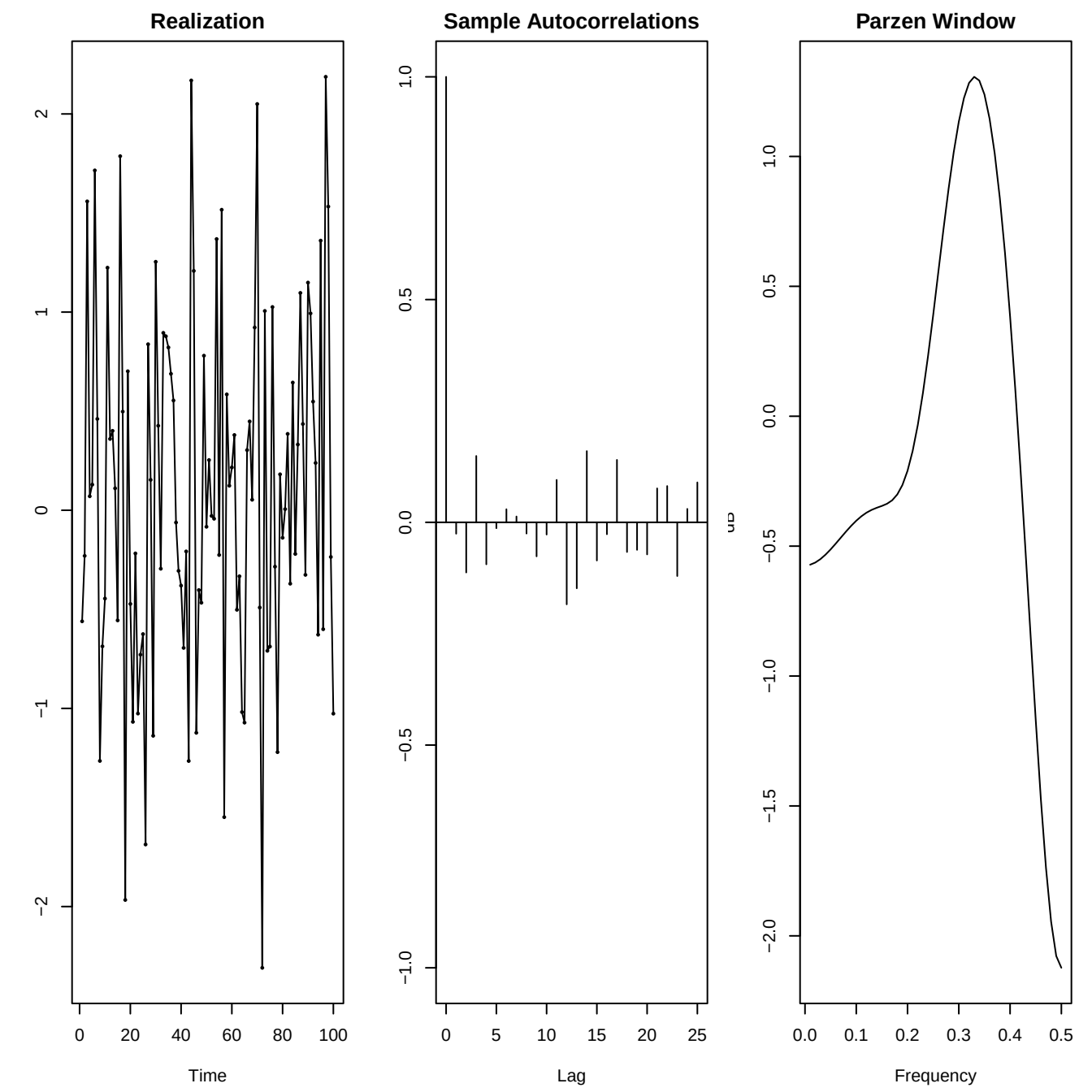
Periodogram

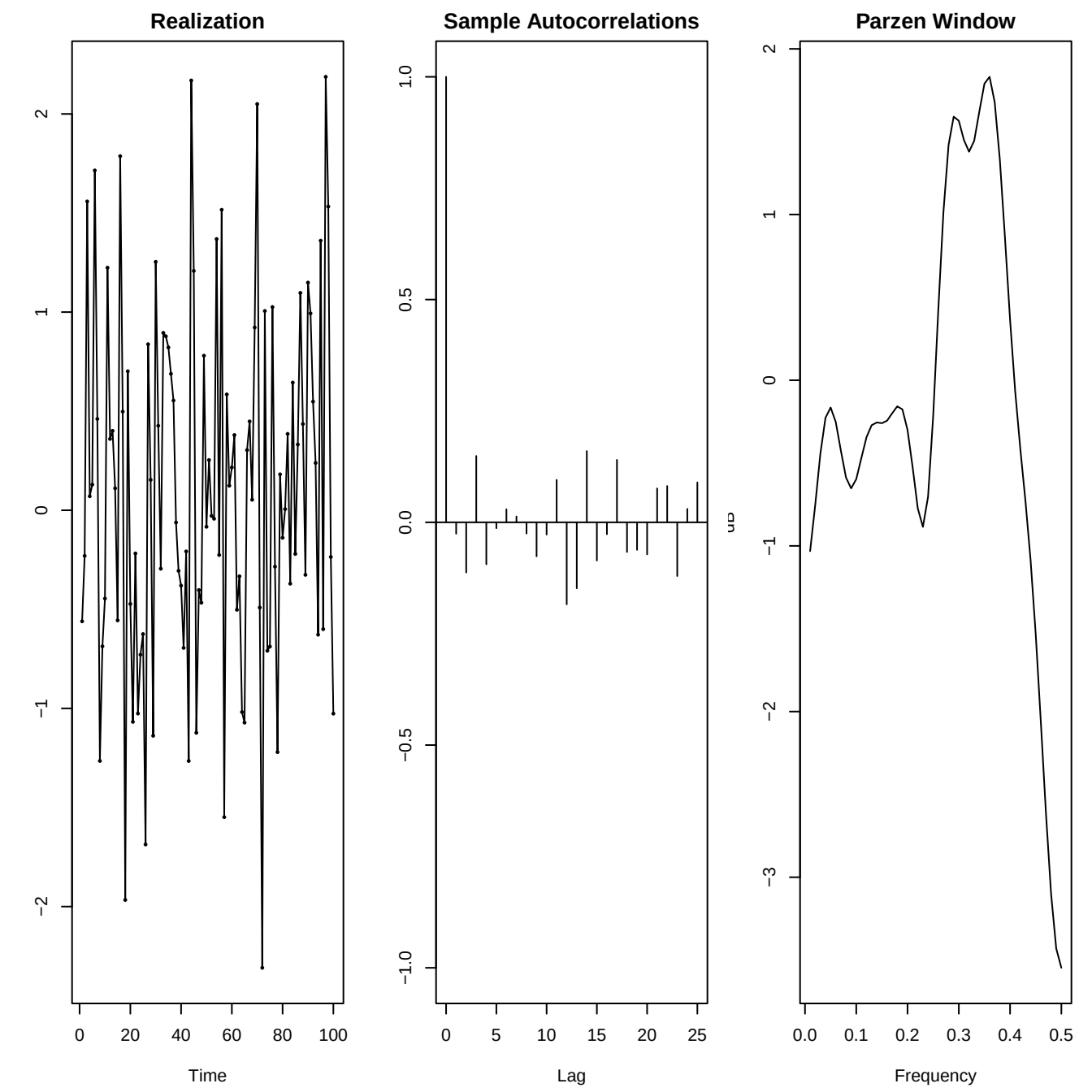

Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency
dB
Periodogram
Frequency
dB

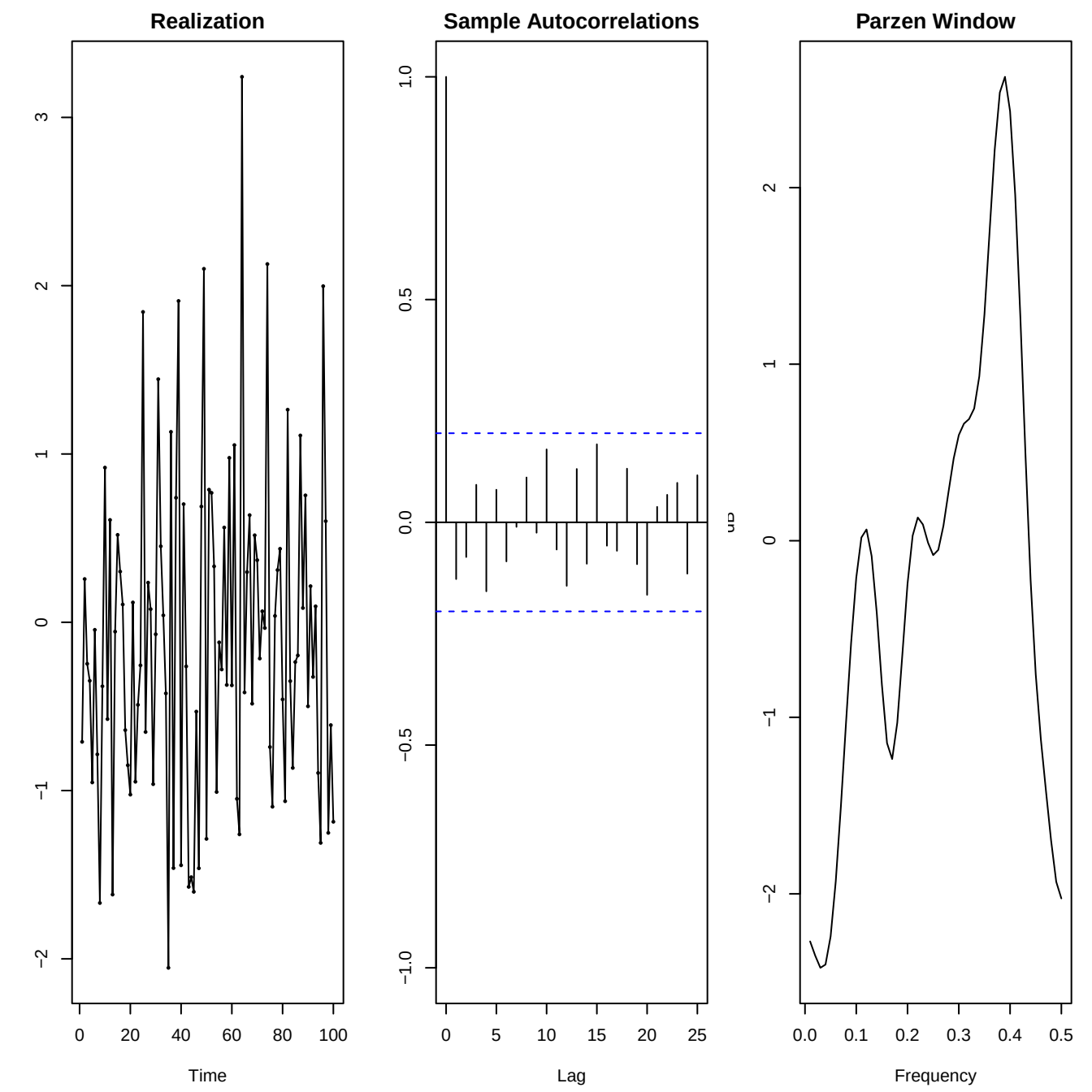

Realization
Sample Autocorrelations
Parzen Window
Time
Lag
Frequency

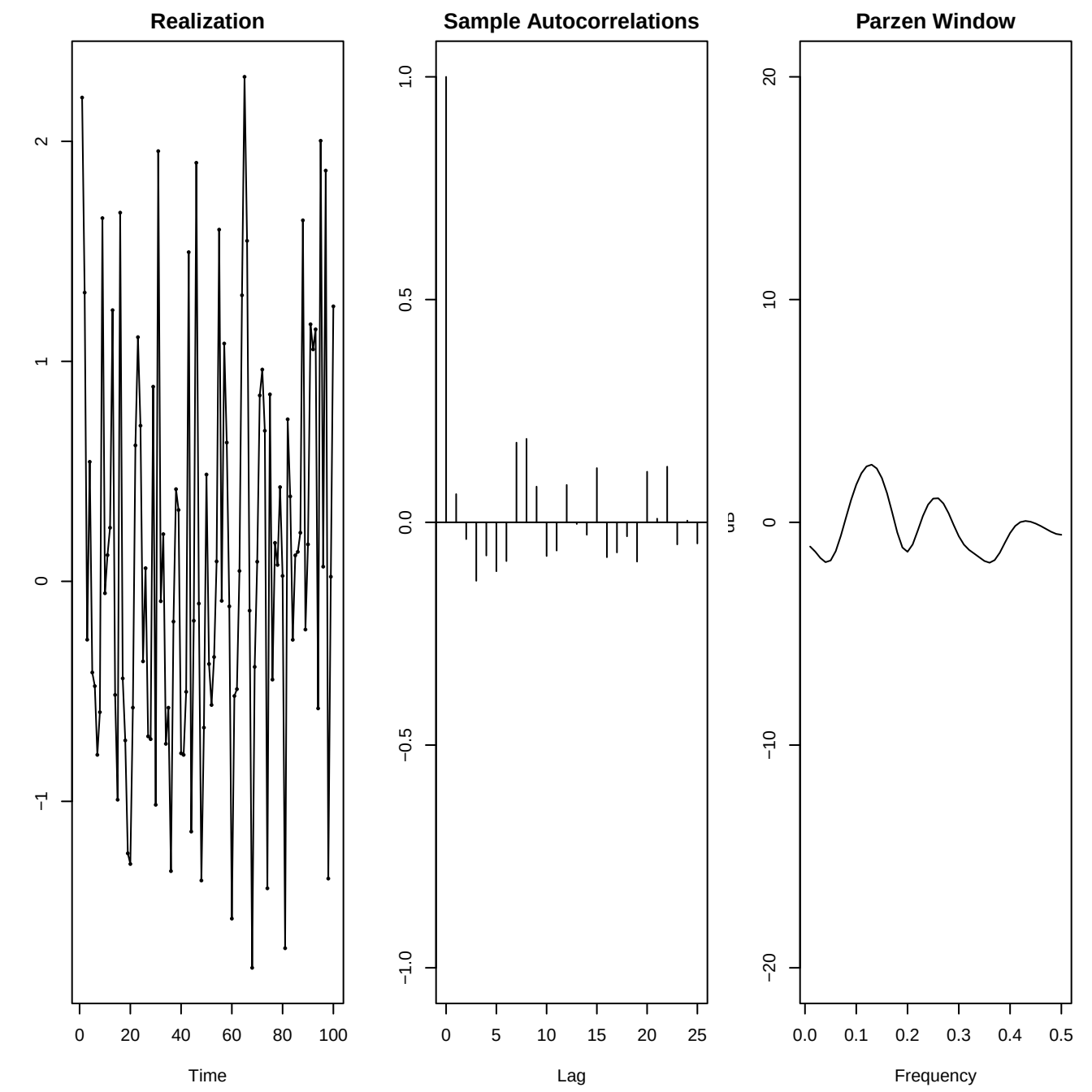

Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency

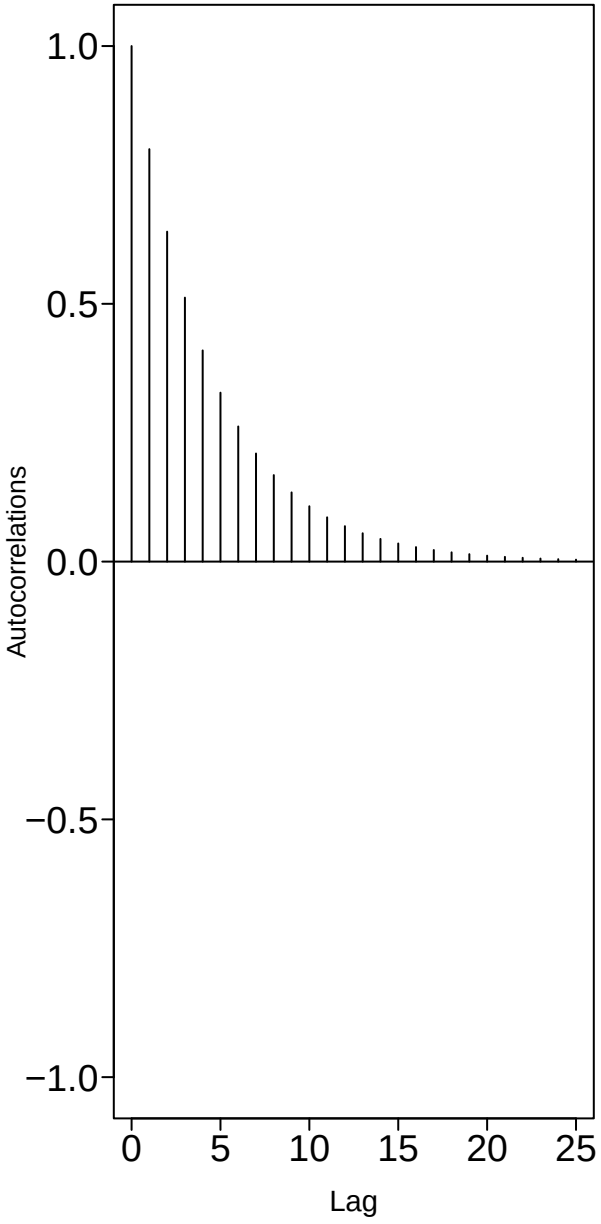

Realization
Time
Sample Autocorrelations
Lag
Parzen Window
dB
Frequency
Periodogram
dB
Frequency


Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency

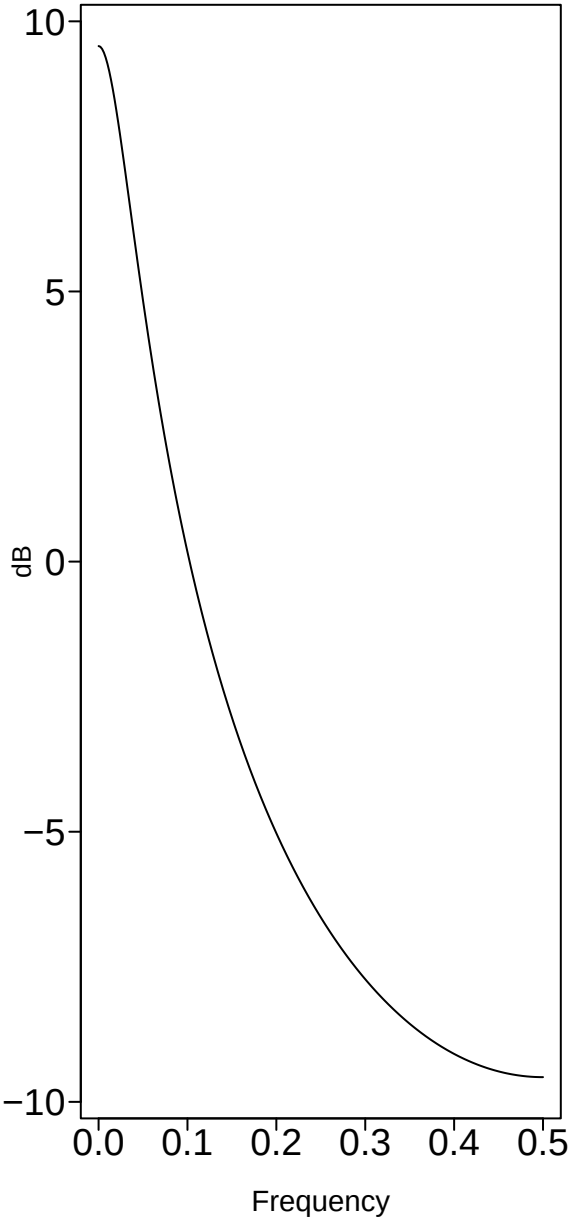

Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency
gs


Realization
Time
Sample Autocorrelations
Lag
Parzen Window
Frequency
gn

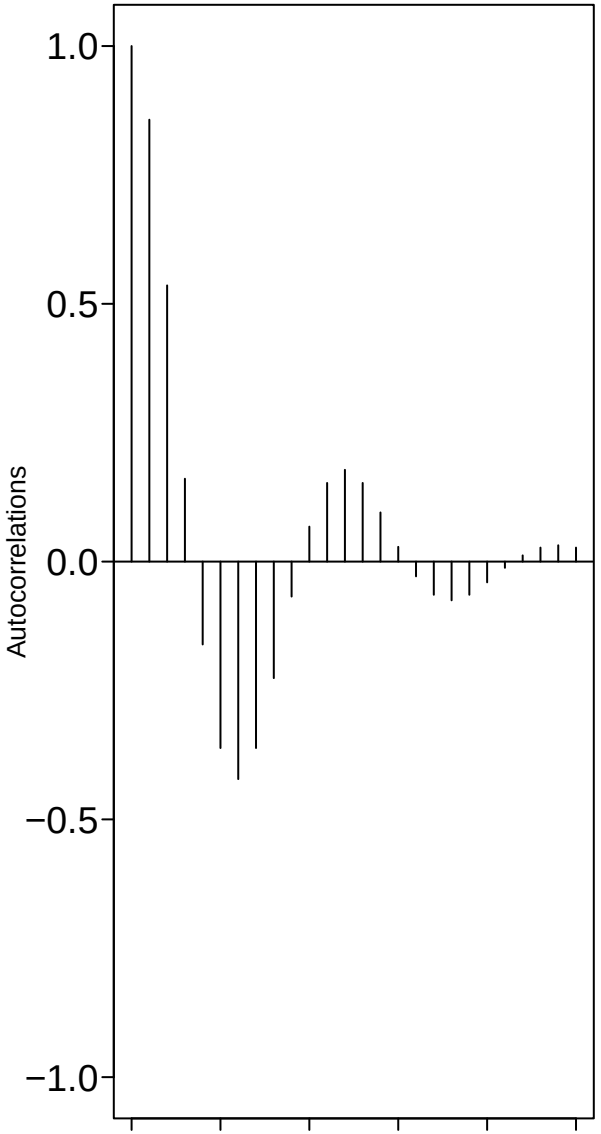

Realization
Sample Autocorrelations
Parzen Window
Time
Lag
Frequency



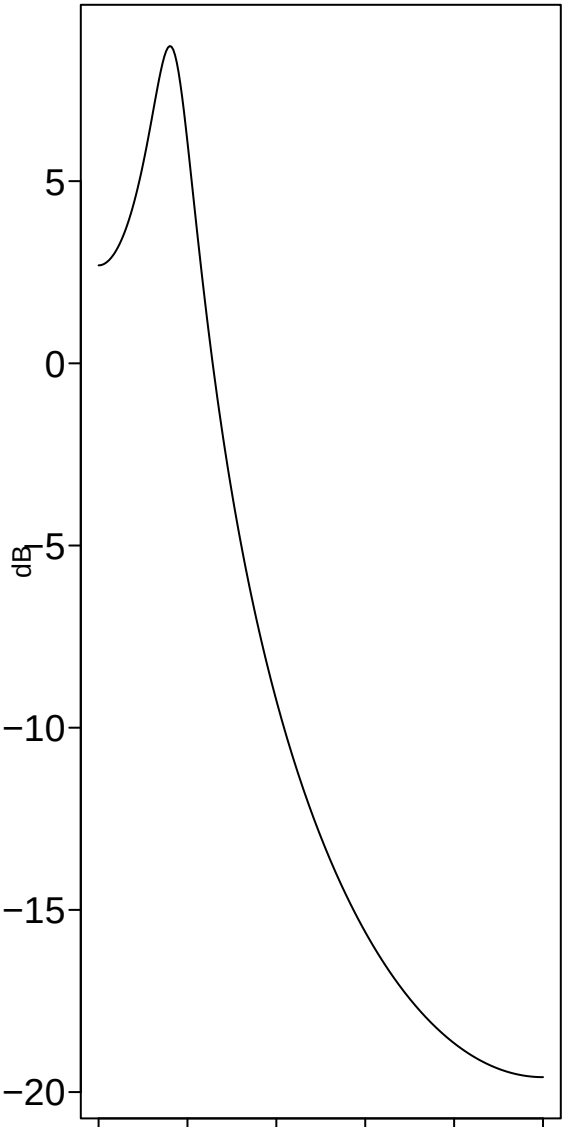
(a) True Autocorrelations



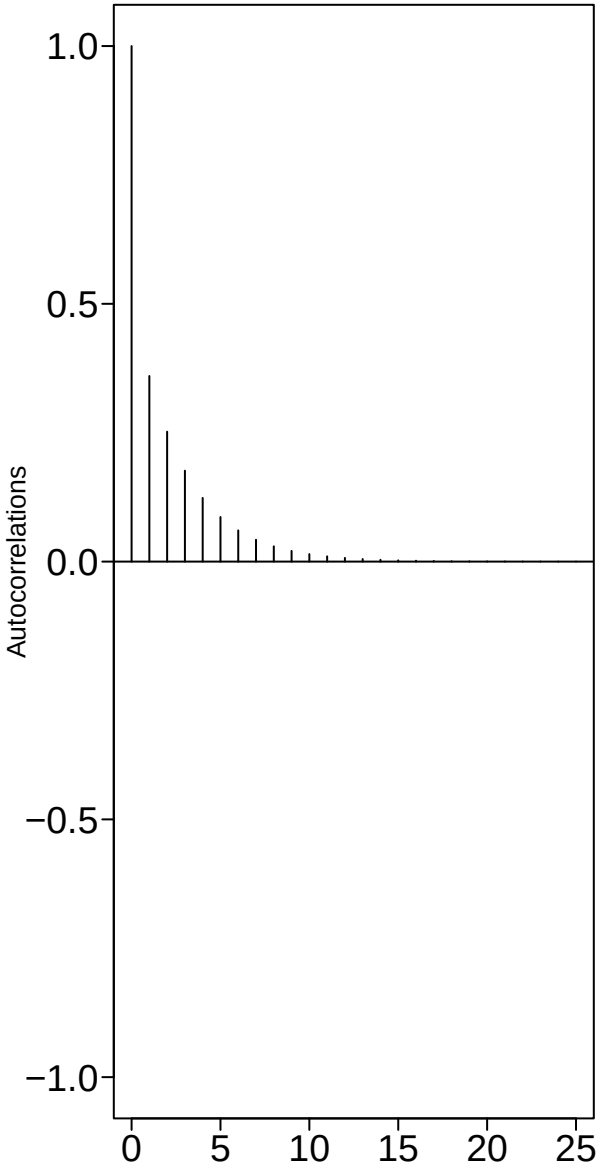
(b) True Spectral Density



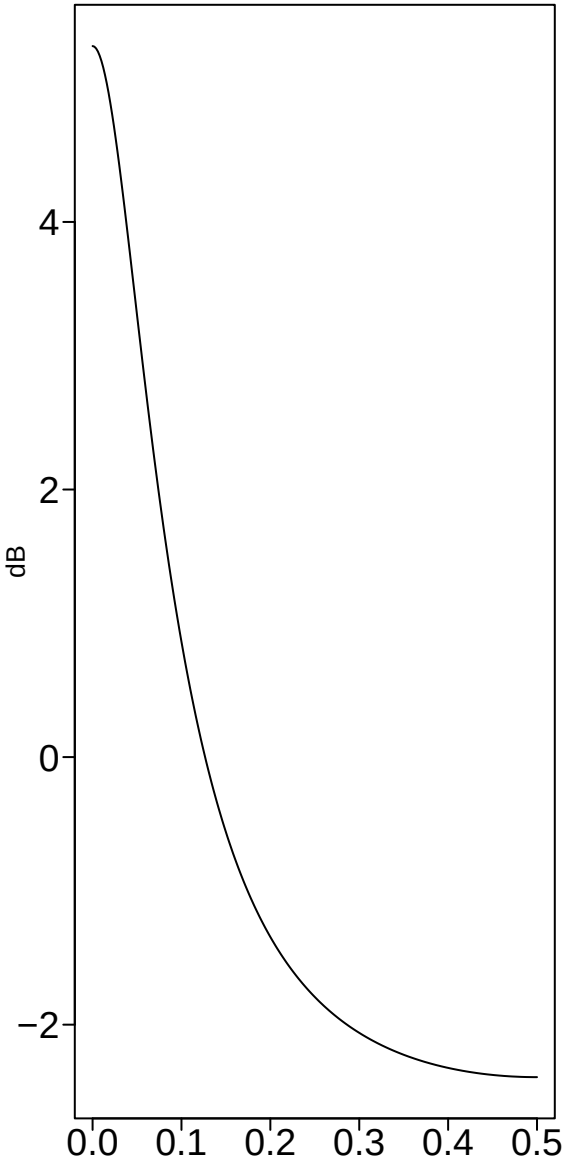
(a) True Autocorrelations



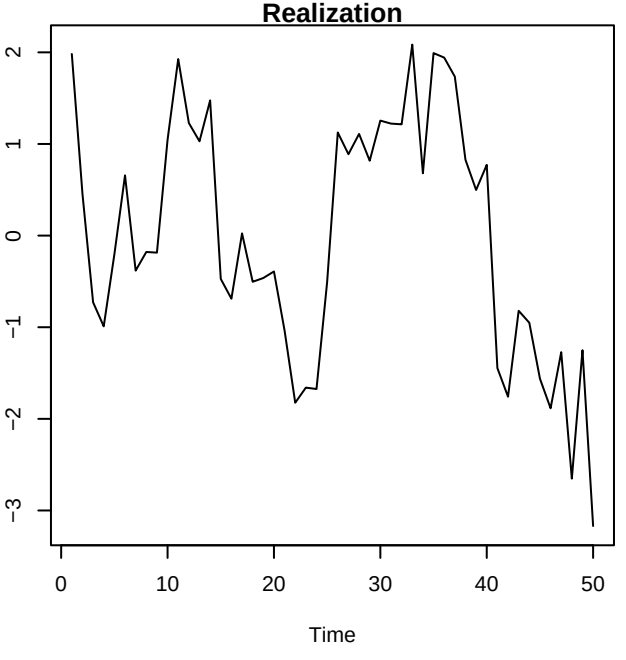
(b) True Spectral Density

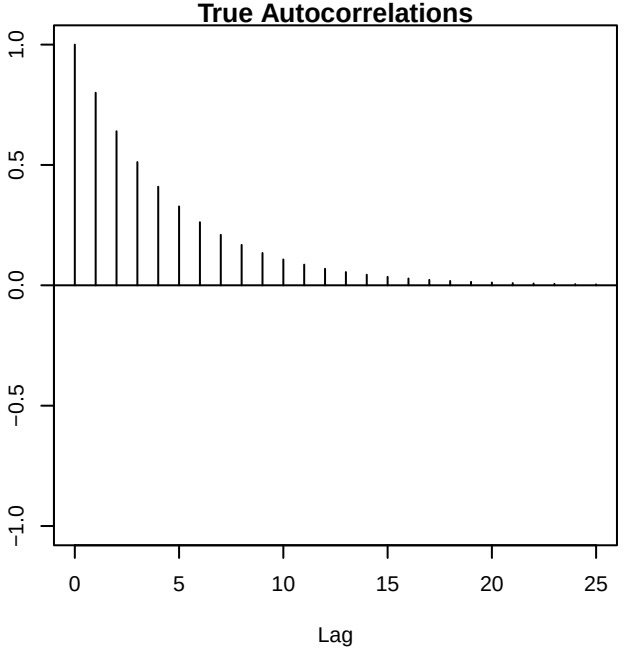


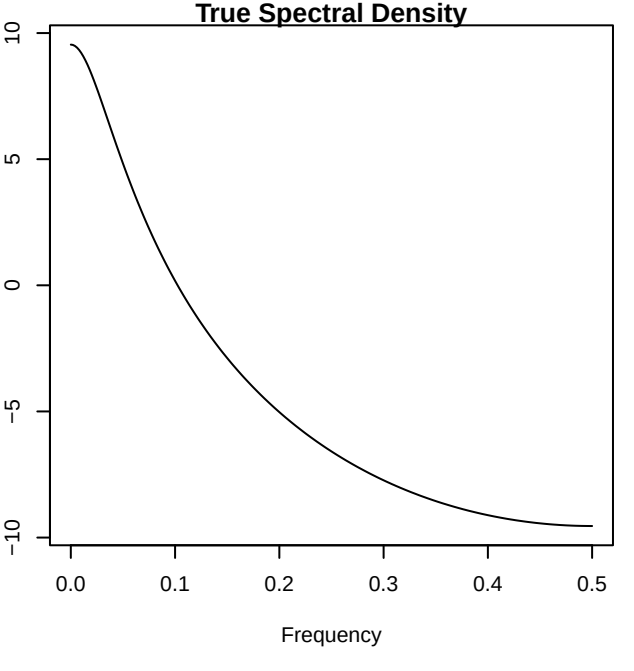
(a) True Autocorrelations

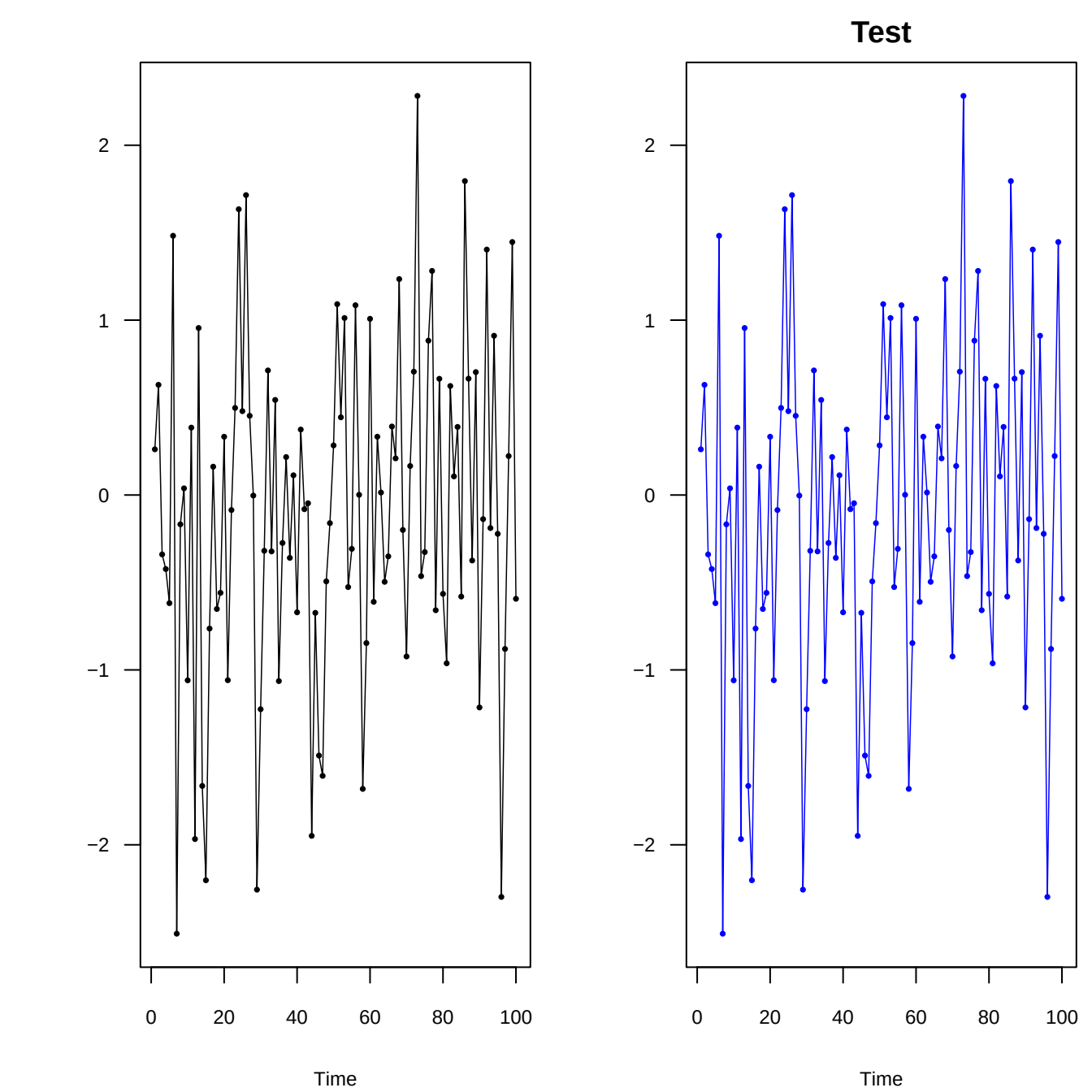


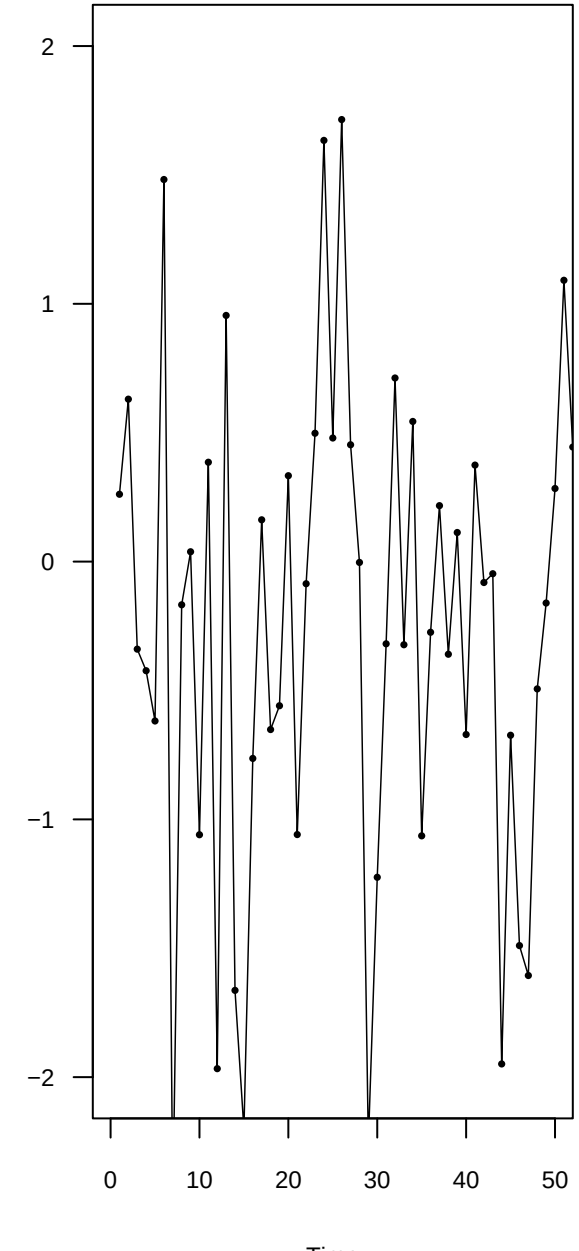
(b) True Spectral Density

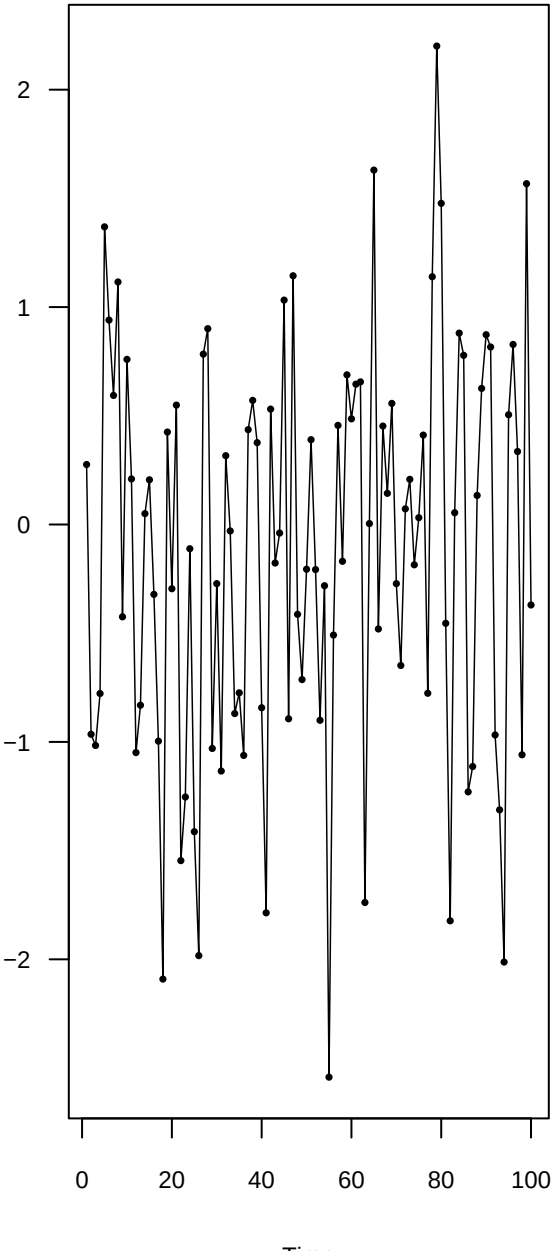

Realization
2
1
0
−1
−2
−3
0
10
20
30
40
50
Time

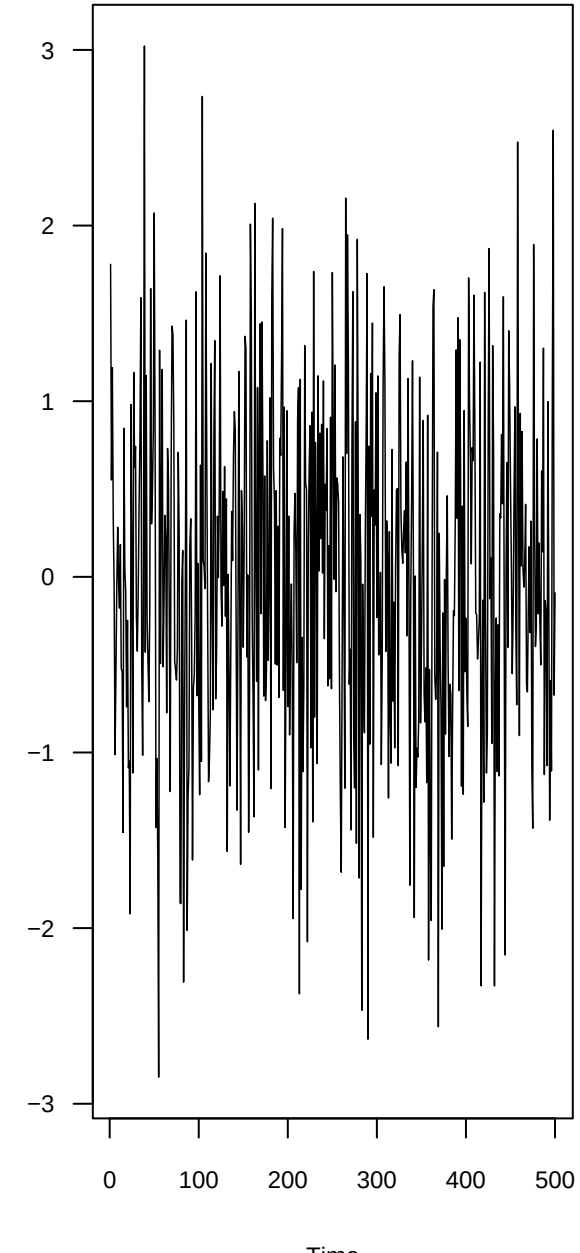

True Autocorrelations
1.0
0.5
0.0
−0.5
−1.0
0
5
10
15
20
25
Lag

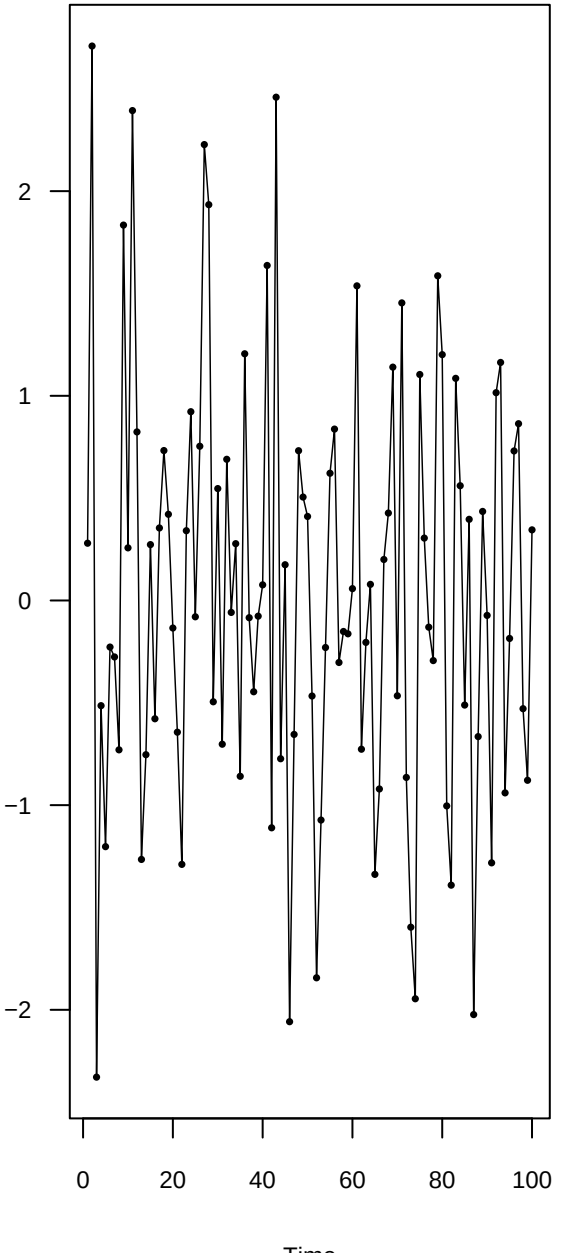

True Spectral Density
10
5
0
−5
−10
0.0
0.1
0.2
0.3
0.4
0.5
Frequency

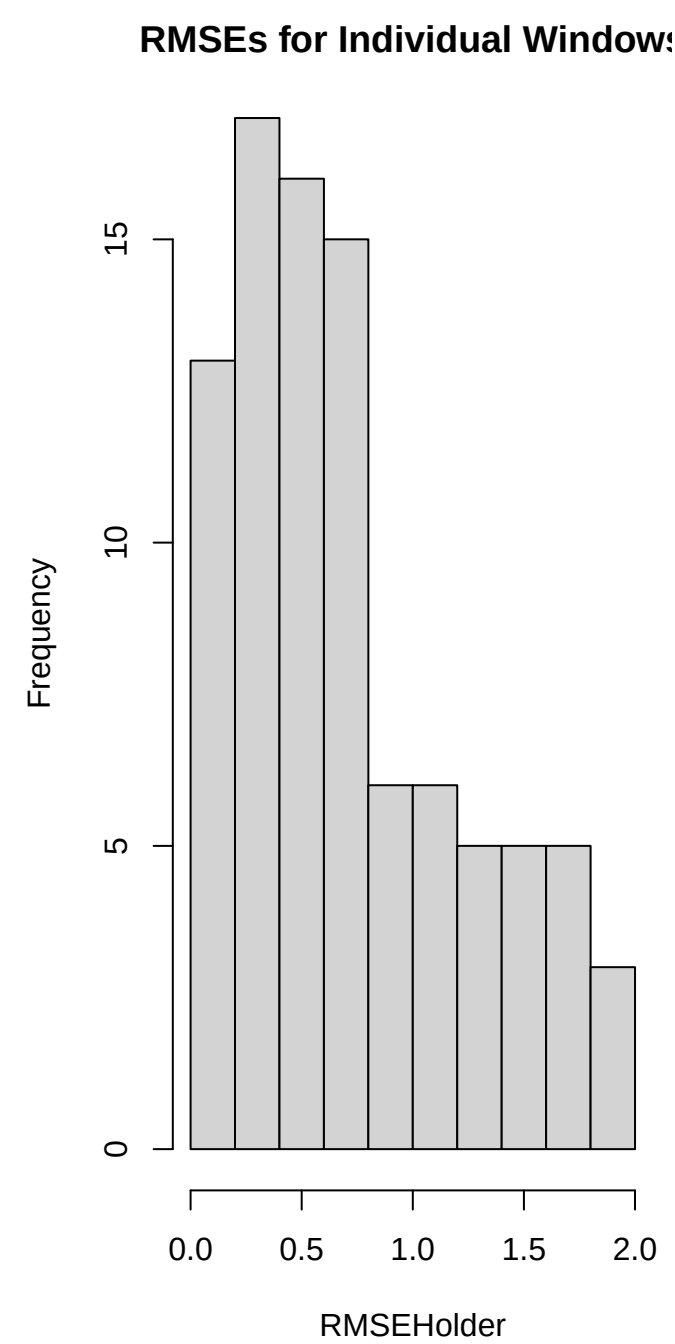

Test
2
1
0
−1
−2
0
20
40
60
80
100
Time
2
1
0
−1
−2
0
20
40
60
80
100
Time

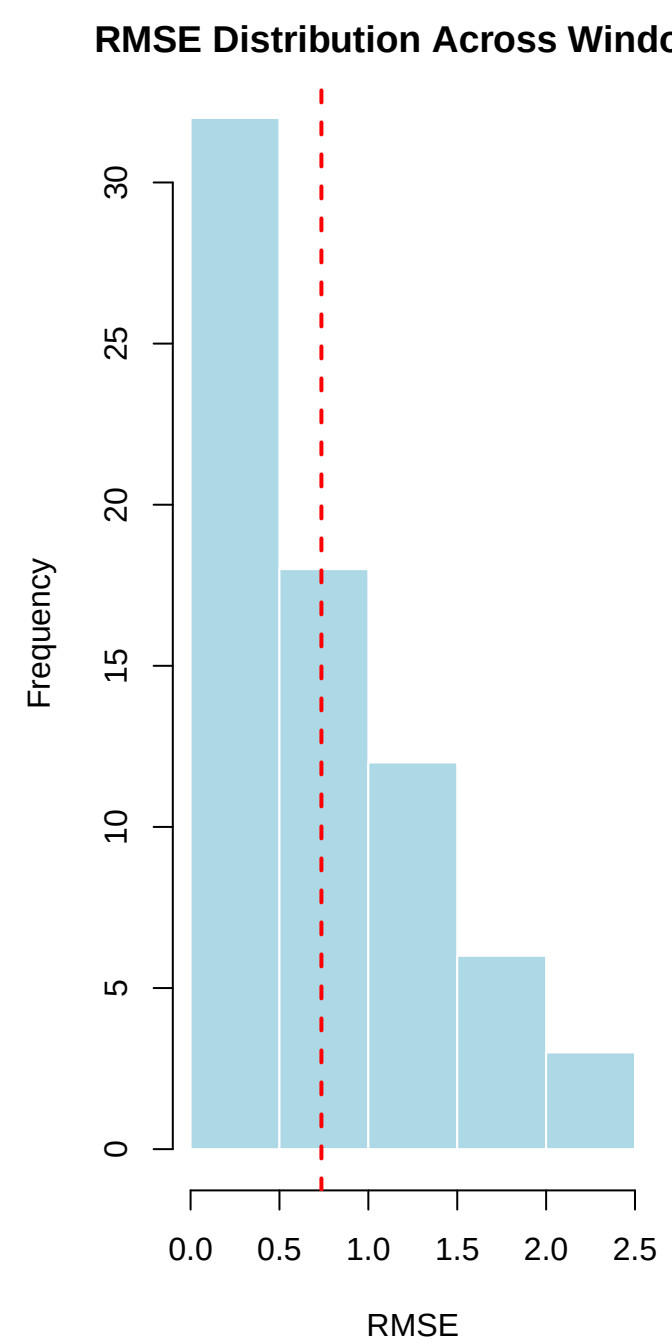

2
1
0
−1
−2
0
10
20
30
40
50
Time

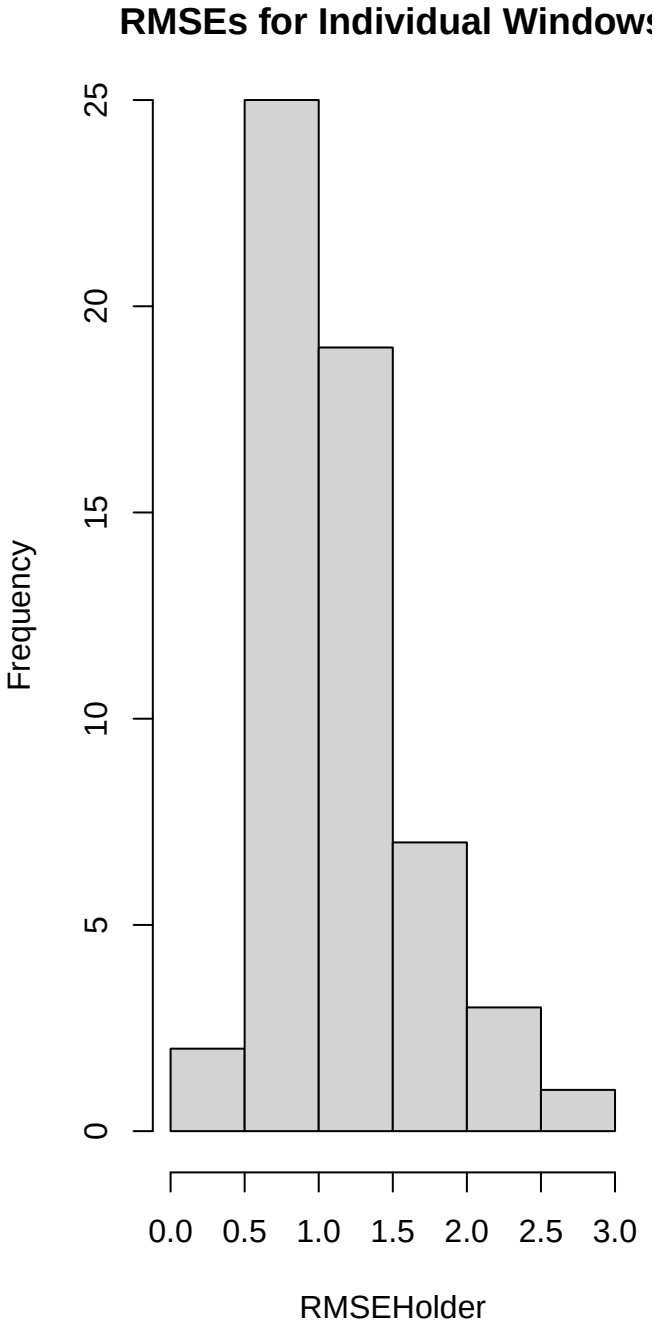

2
1
0
−1
−2
0
20
40
60
80
100
Time

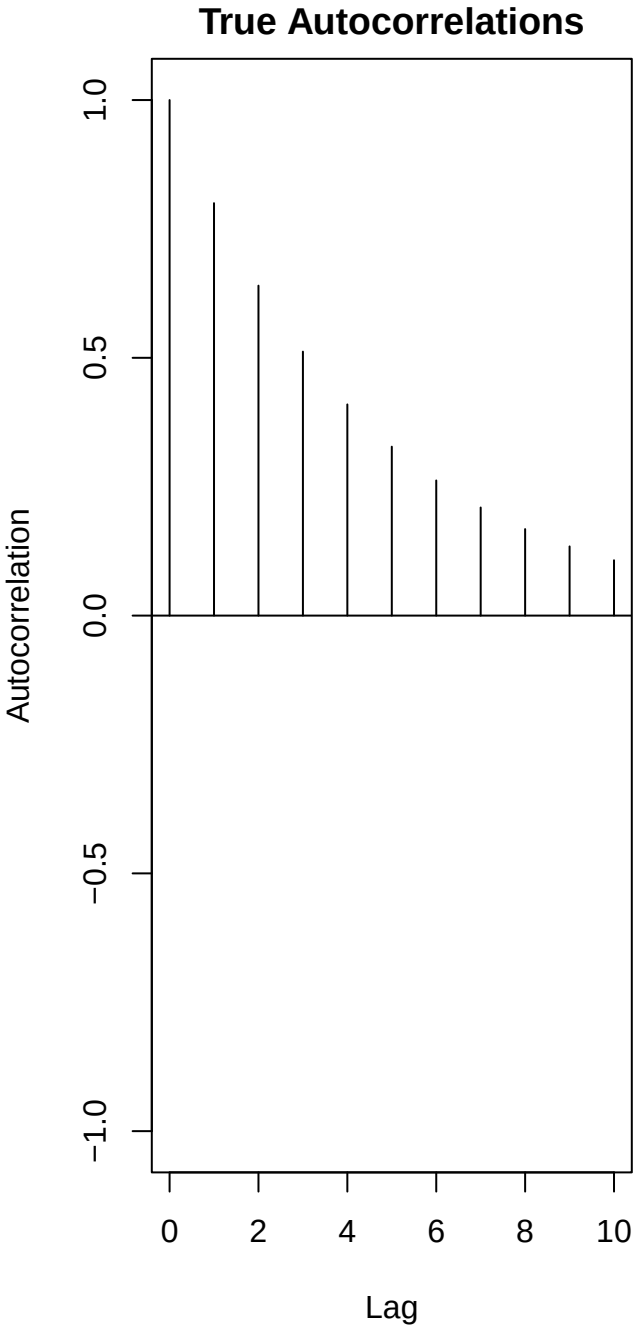

3
2
1
0
−1
−2
−3
0
100
200
300
400
500
Time

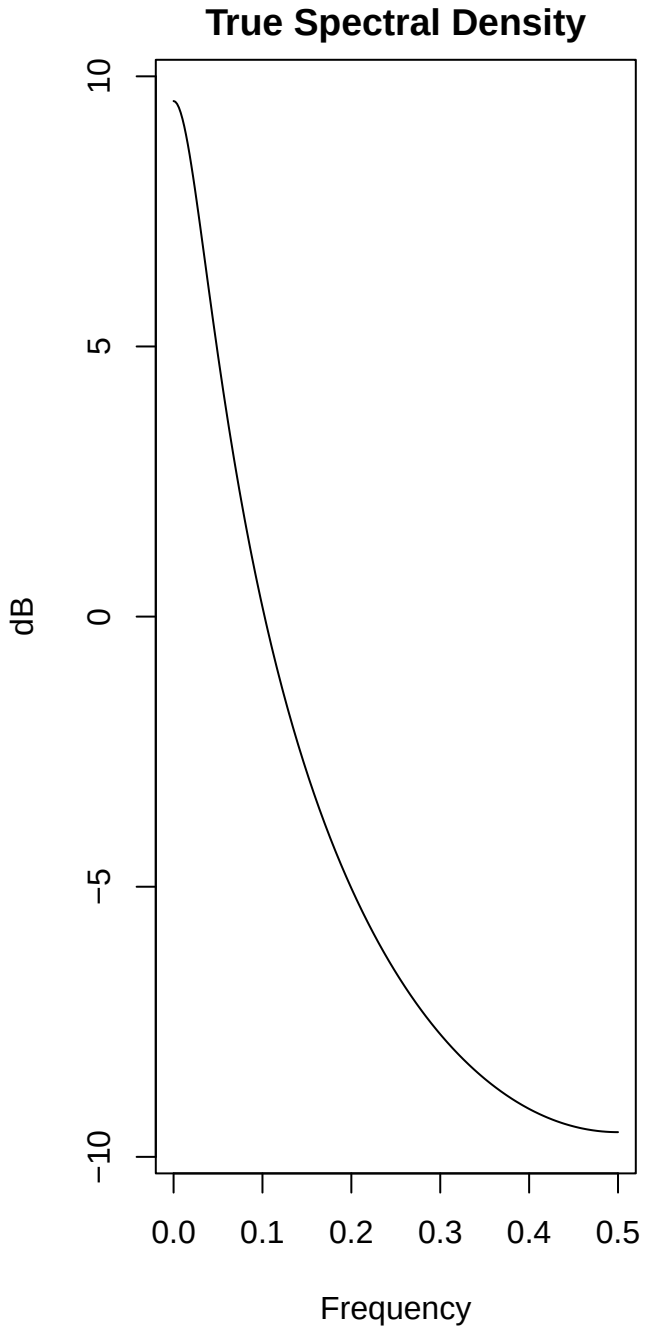

2
1
0
−1
−2
0
20
40
60
80
100
Time


RMSEs for Individual Windows
Frequency
0
5
10
15
0.0
0.5
1.0
1.5
2.0
RMSEHolder


RMSE Distribution Across Windo
Frequency
0
5
10
15
20
25
30
0.0
0.5
1.0
1.5
2.0
2.5
RMSE


RMSEs for Individual Windows
Frequency
0
5
10
15
20
25
0.0
0.5
1.0
1.5
2.0
2.5
3.0
RMSEHolder


True Autocorrelations
Autocorrelation
−1.0
−0.5
0.0
0.5
1.0
0
2
4
6
8
10
Lag


True Spectral Density
dB
10
5
0
−5
−10
0.0
0.1
0.2
0.3
0.4
0.5
Frequency