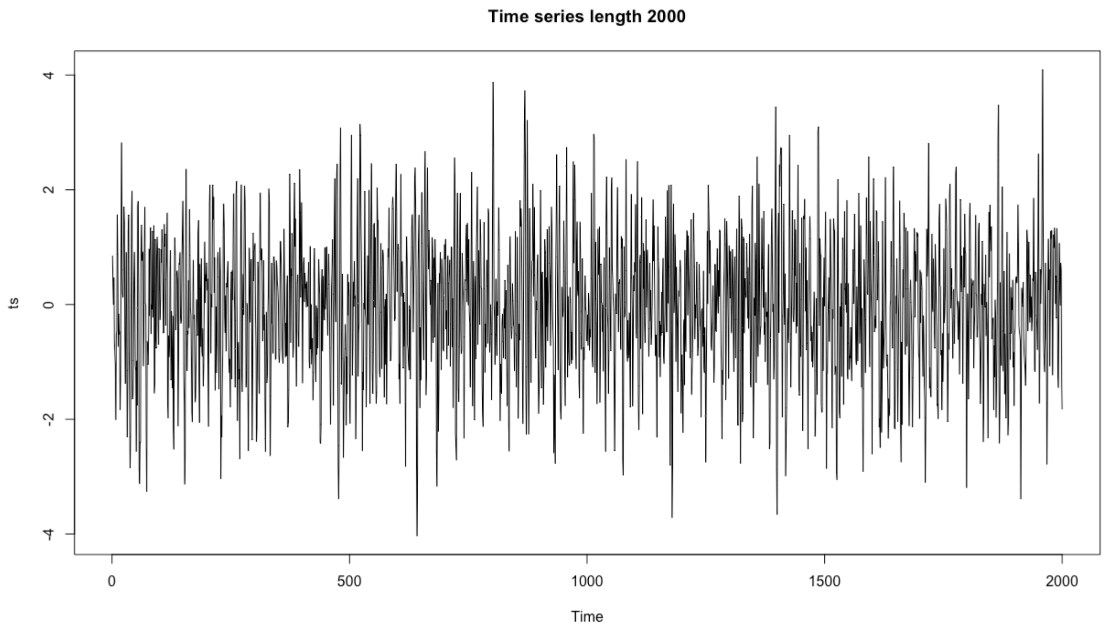
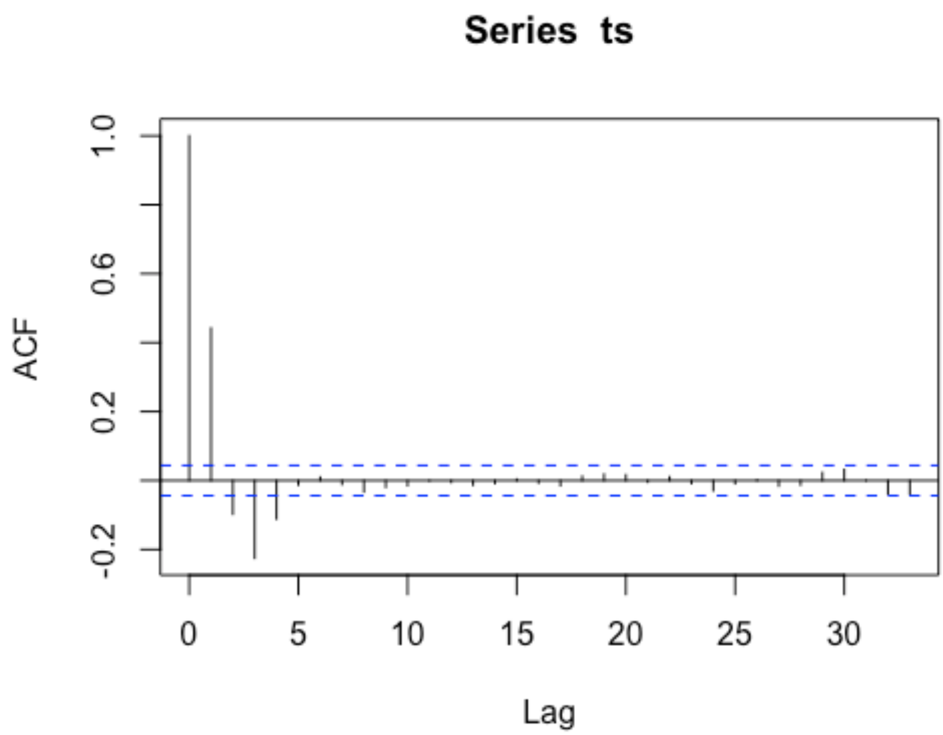
Problem 1

c)

Time series plot



Autocorrelation plot



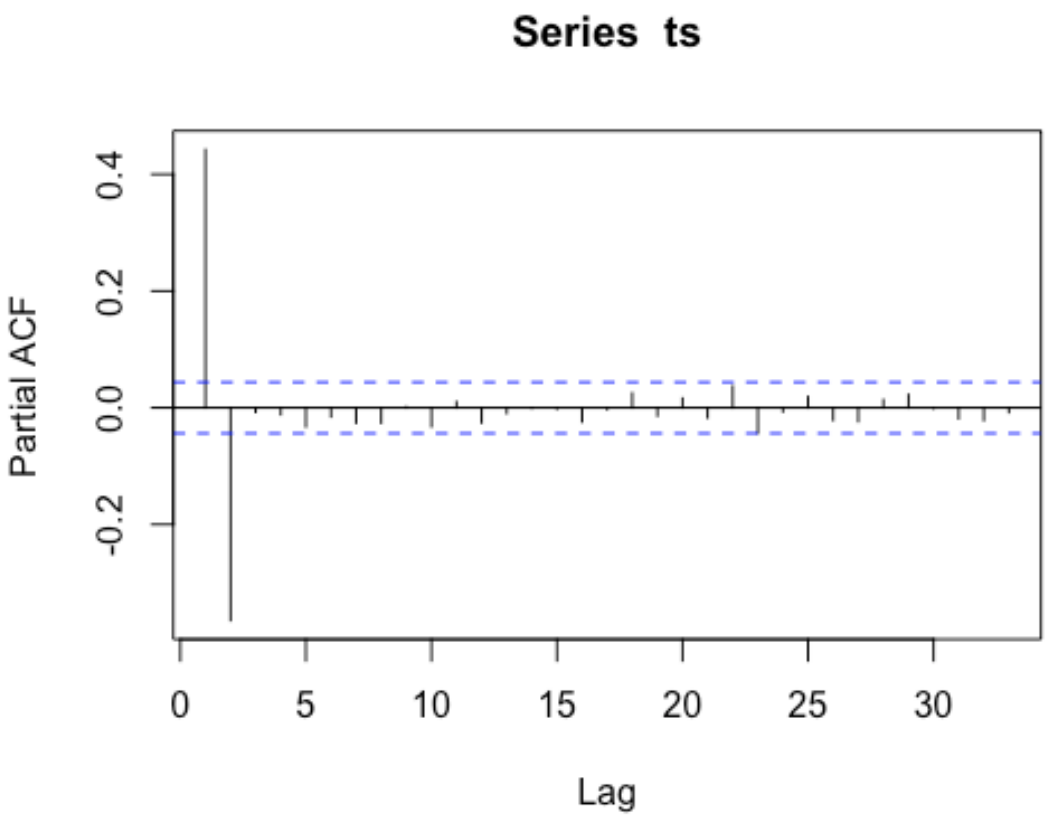
Lag values:

Lag-1: 0.442

Lag-2: -0.098

Lag-3: -0.225

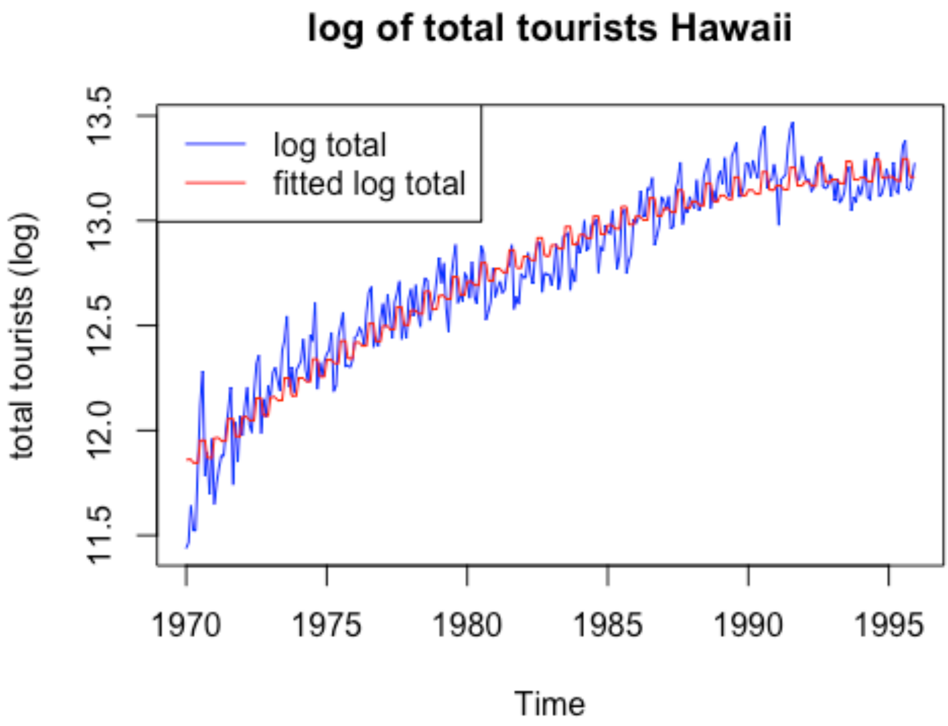
d)
Partial autocorrelation plot



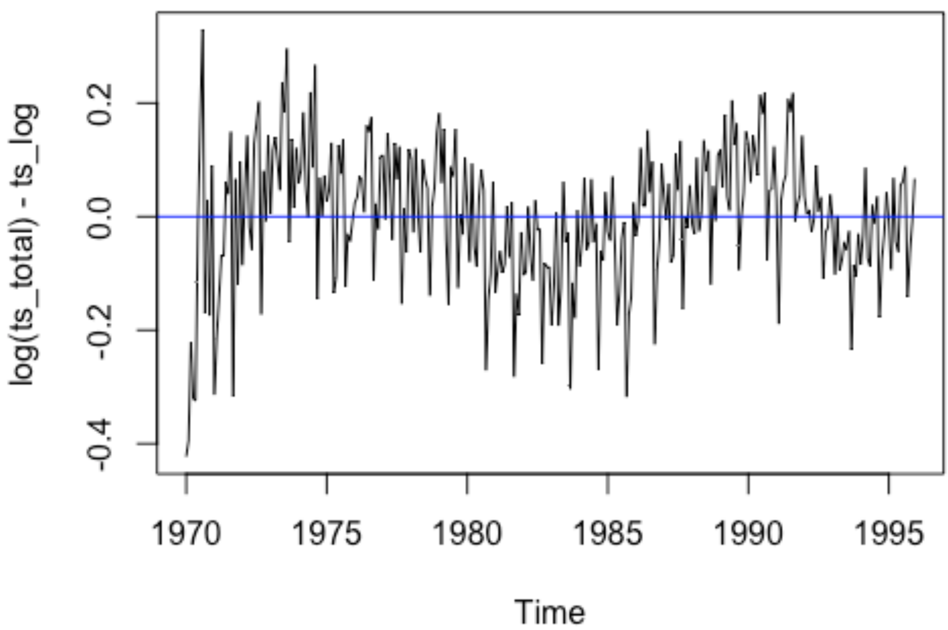
Lag values:
Lag-1: 0.442
Lag-2: -0.364
Lag-3: -0.008

Problem 3

a)

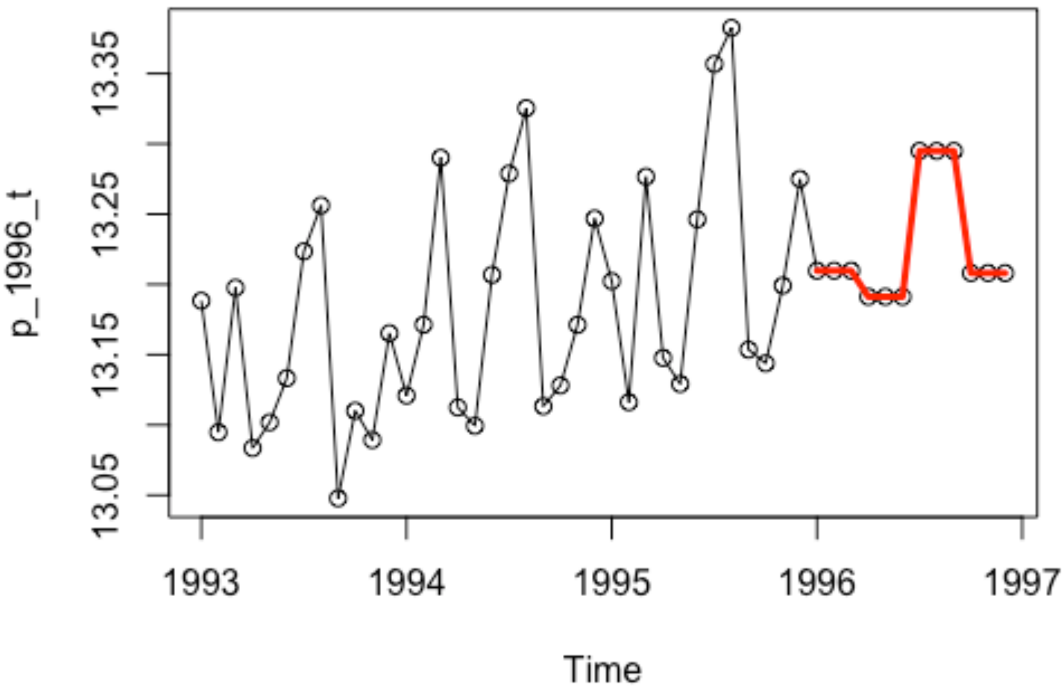


log of total tourists Hawaii
log total
fitted log total
total tourists (log)
13.5
13.0
12.5
12.0
11.5
1970
1975
1980
1985
1990
1995
Time

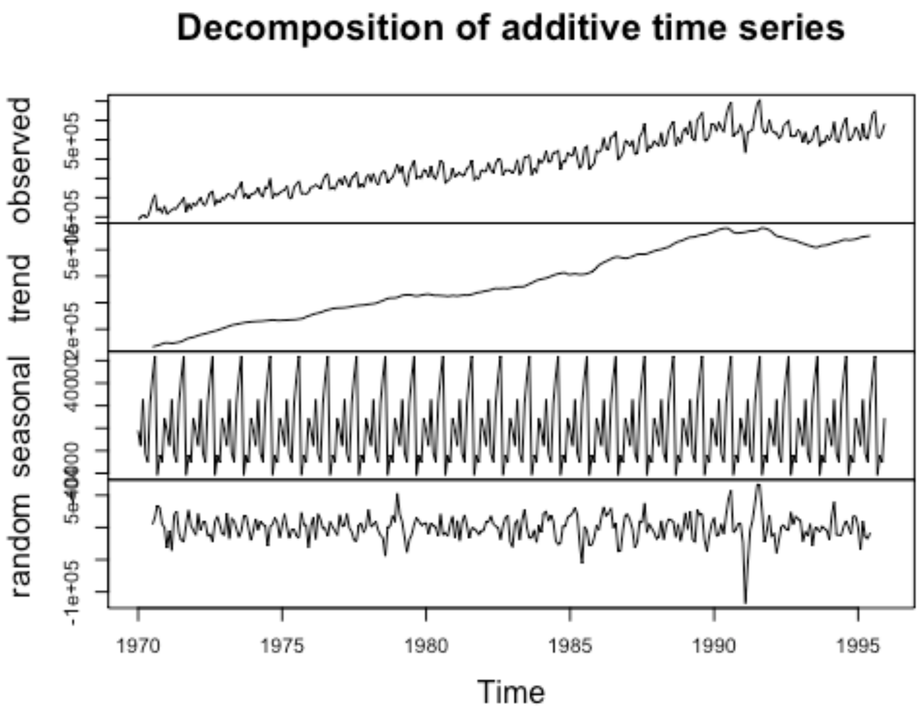


log(ts_total) - ts_log
0.2
0.0
-0.2
-0.4
1970
1975
1980
1985
1990
1995
Time

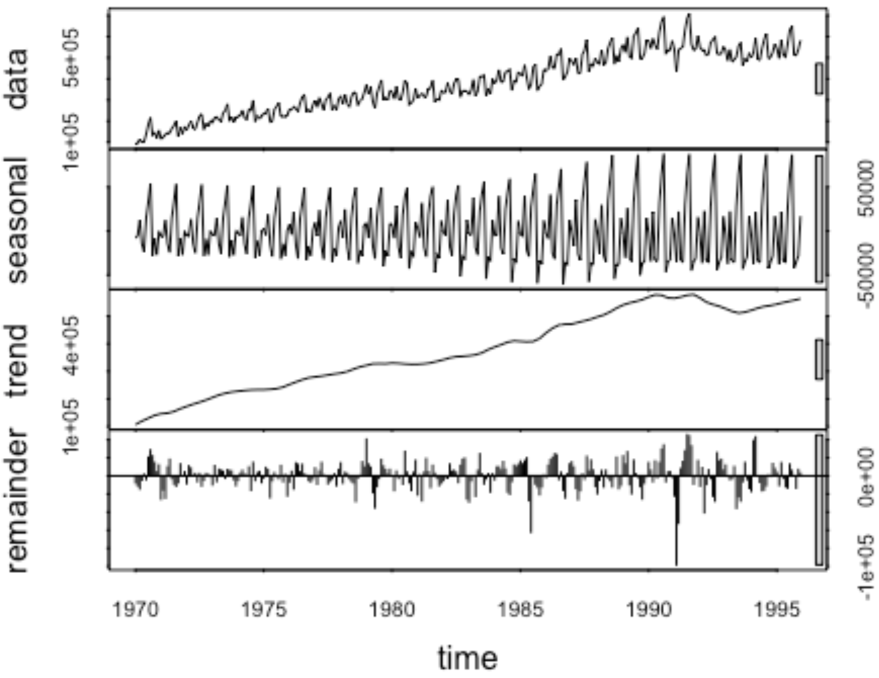
b)



c)
decompose()



stl()


data
seasonal
trend
remainder
5e+05
1e+05
4e+05
1e+05
50000
-50000
0e+00
-1e+05
1970
1975
1980
1985
1990
1995
time

Problem 4

a)

log likelihood = -446.1314

b)

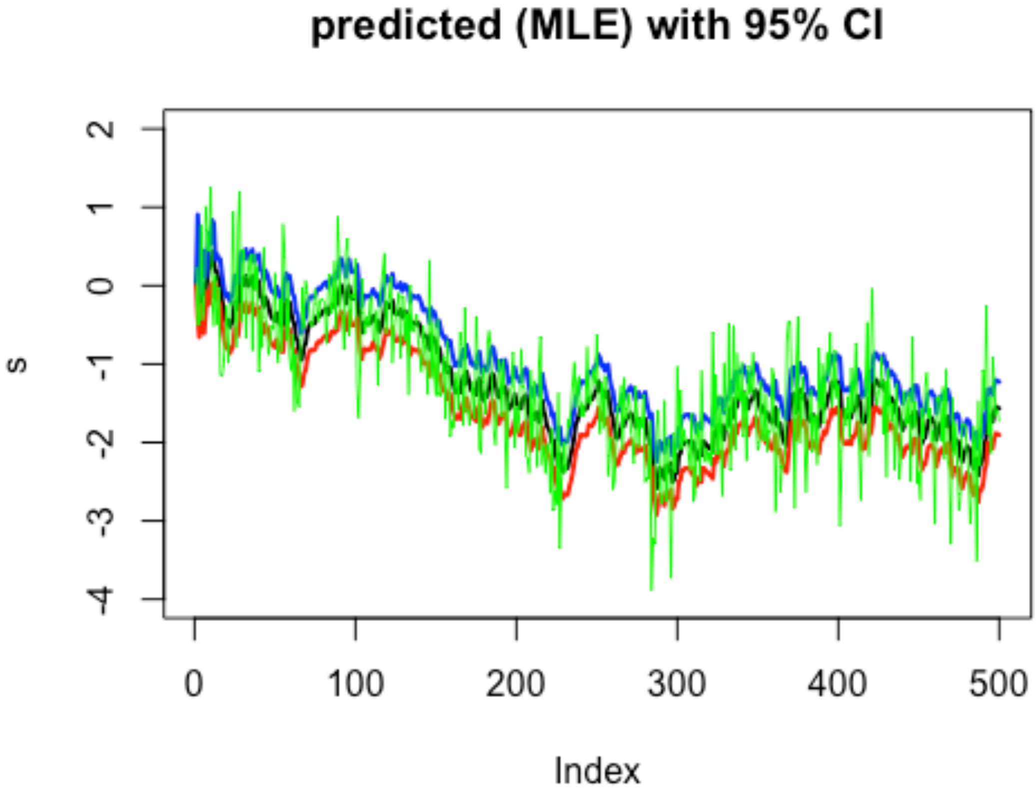
log likelihood = -446.9549

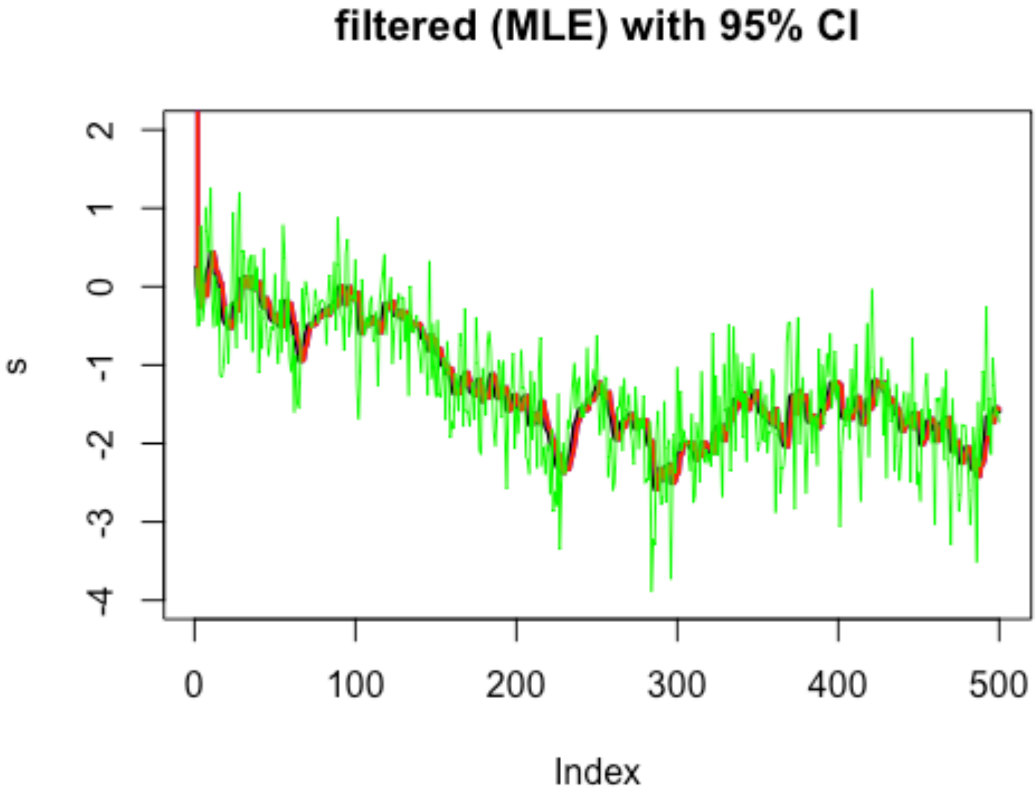
c)

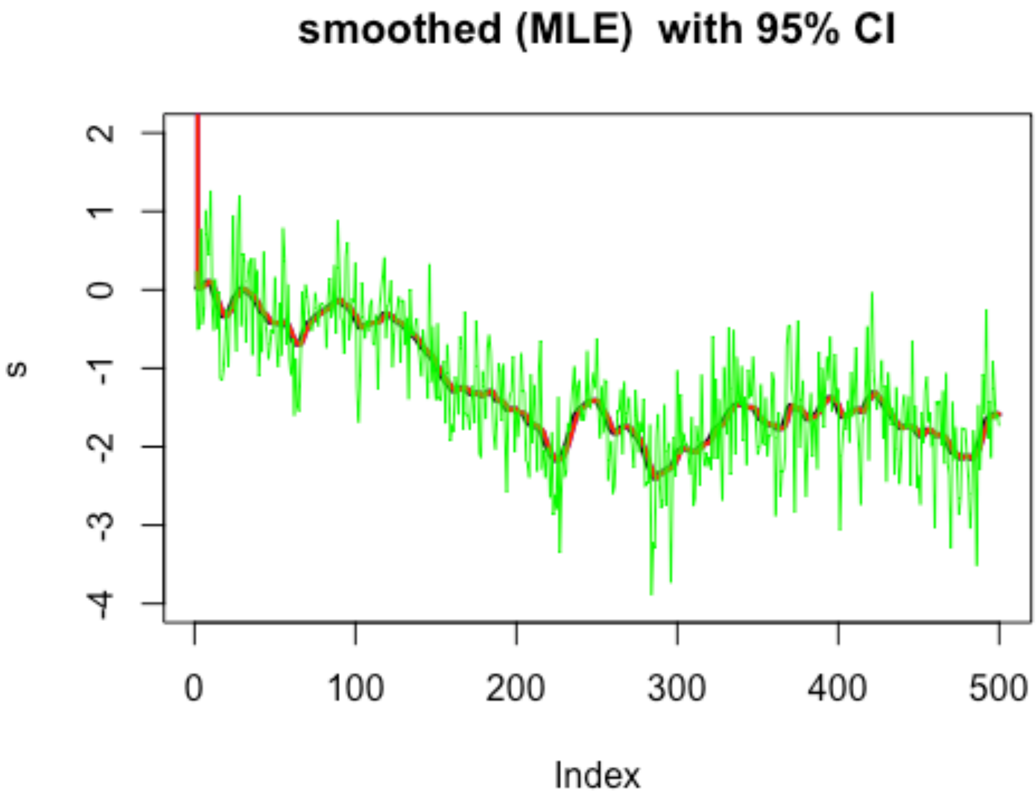
MLE σ_e^2 and σ_η^2.

0.287369728 | 0.009473803

d)




filtered (MLE) with 95% CI
s
2
1
0
-1
-2
-3
-4
0
100
200
300
400
500
Index


smoothed (MLE) with 95% CI
s
2
1
0
-1
-2
-3
-4
0
100
200
300
400
500
Index

e)

```
Call:
StructTS(x = yt, type = "level", fixed = c(NA, NA))

Variances:
   level   epsilon
0.009457  0.287413
```

Comparing the variance estimates with the ones from part c), they are practically the same, the difference is minimal.