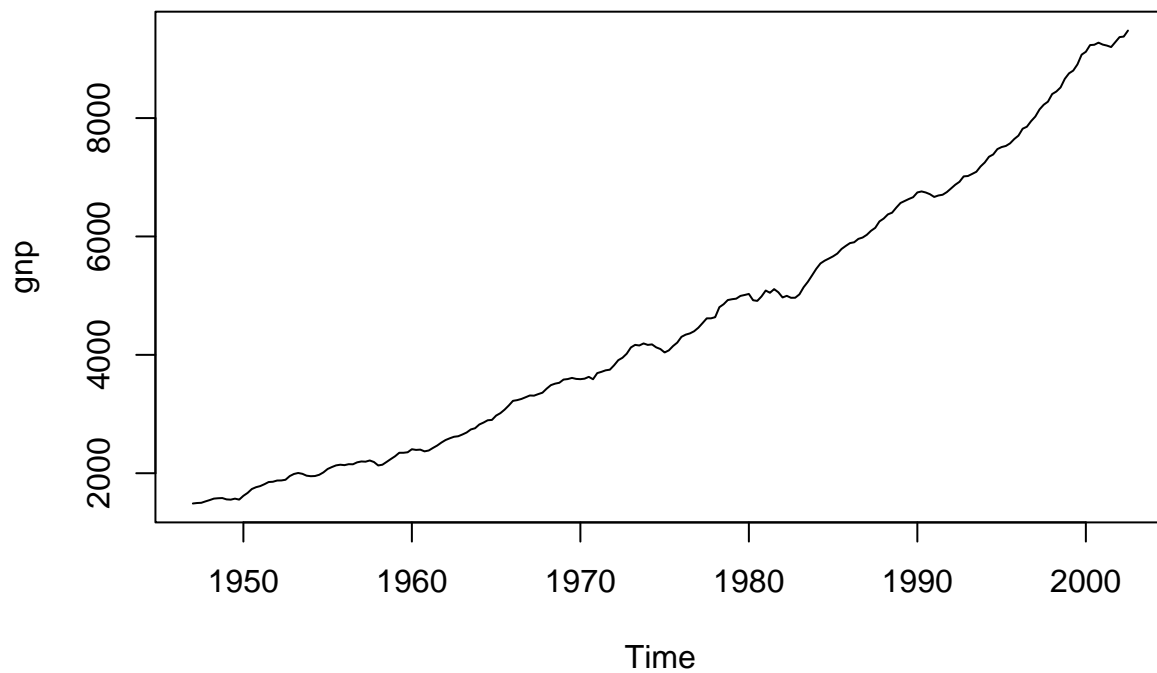


Lab 7: Illustration of ARIMA fitting

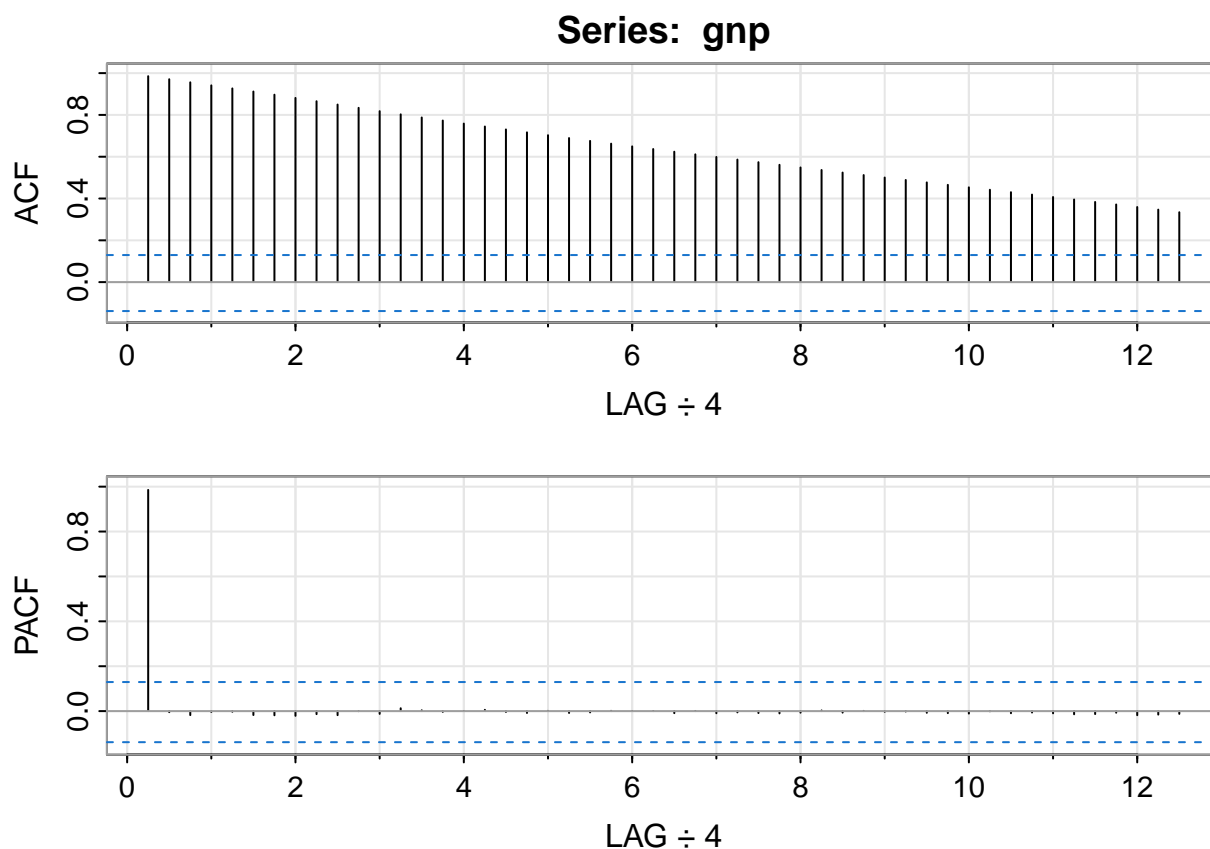
Arnab Hazra

2024-10-15

```
library(astsa)  
plot(gnp)
```

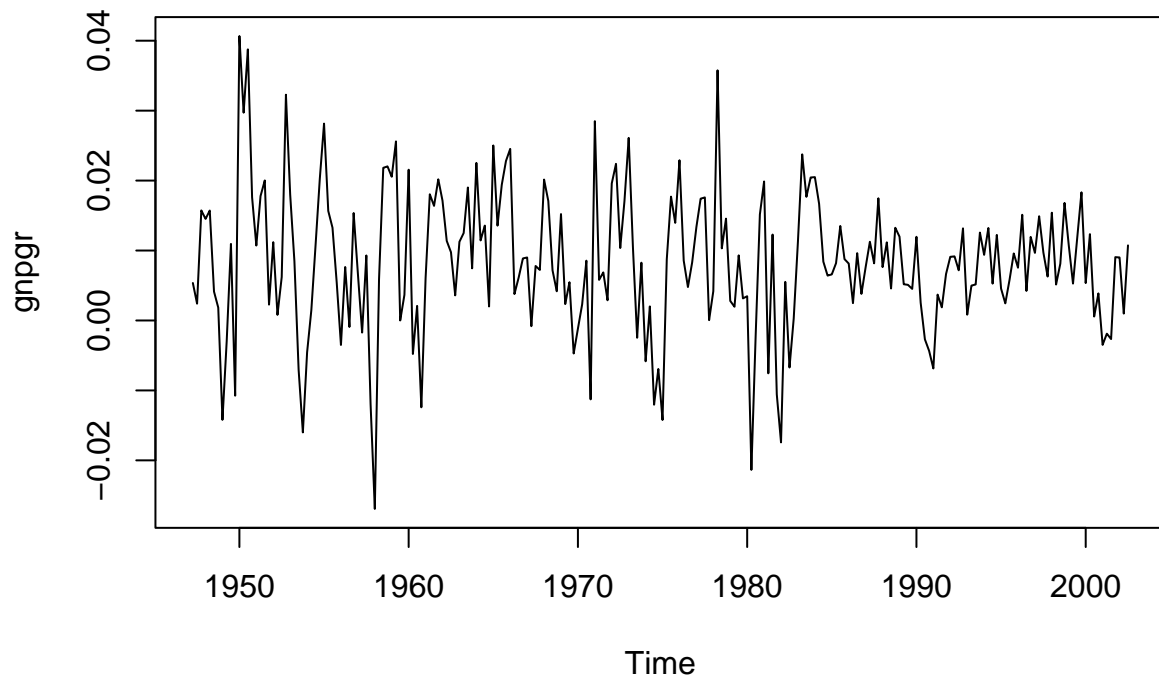


```
acf2(gnp, 50)
```

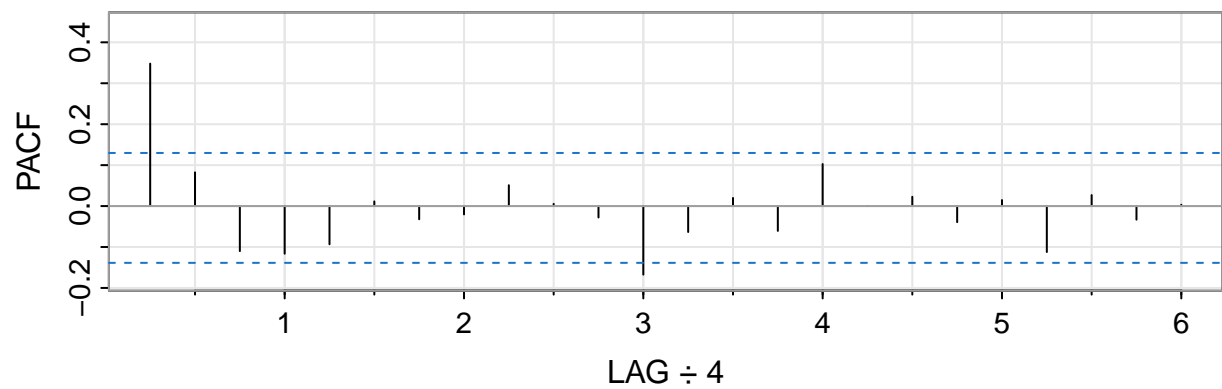
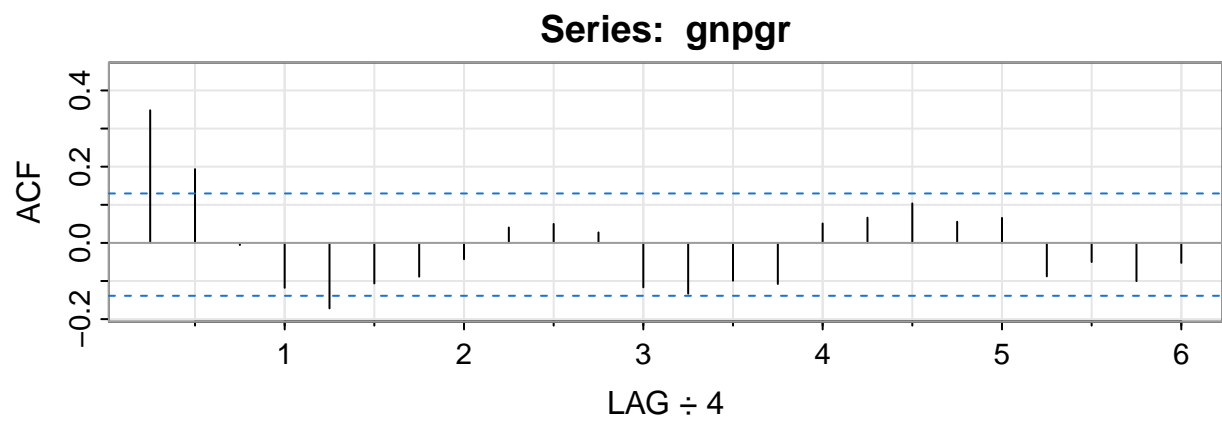


```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12] [,13]
## ACF  0.99 0.97 0.96 0.94 0.93 0.91 0.90 0.88 0.87 0.85 0.83 0.82 0.80
## PACF 0.99 0.00 -0.02 0.00 0.00 -0.02 -0.02 -0.02 -0.01 -0.02 0.00 -0.01 0.01
##      [,14] [,15] [,16] [,17] [,18] [,19] [,20] [,21] [,22] [,23] [,24] [,25]
## ACF  0.79 0.77 0.76 0.74 0.73 0.72 0.7 0.69 0.68 0.66 0.65 0.64
## PACF 0.00 0.00 0.00 0.01 0.00 -0.01 0.0 -0.01 -0.01 0.00 0.00 0.00
##      [,26] [,27] [,28] [,29] [,30] [,31] [,32] [,33] [,34] [,35] [,36] [,37]
## ACF  0.62 0.61 0.60 0.59 0.57 0.56 0.55 0.54 0.52 0.51 0.5 0.49
## PACF -0.01 0.00 -0.01 -0.01 -0.01 -0.01 -0.01 0.00 -0.01 0.00 0.0 0.00
##      [,38] [,39] [,40] [,41] [,42] [,43] [,44] [,45] [,46] [,47] [,48] [,49]
## ACF  0.48 0.47 0.45 0.44 0.43 0.42 0.41 0.40 0.38 0.37 0.36 0.35
## PACF -0.01 -0.01 -0.01 0.00 -0.01 -0.01 -0.01 -0.01 -0.01 -0.01 -0.02 -0.02
##      [,50]
## ACF  0.33
## PACF -0.01
```

```
gnpgr = diff(log(gnp)) # growth rate
plot(gnpgr)
```



```
acf2(gnpgr, 24)
```

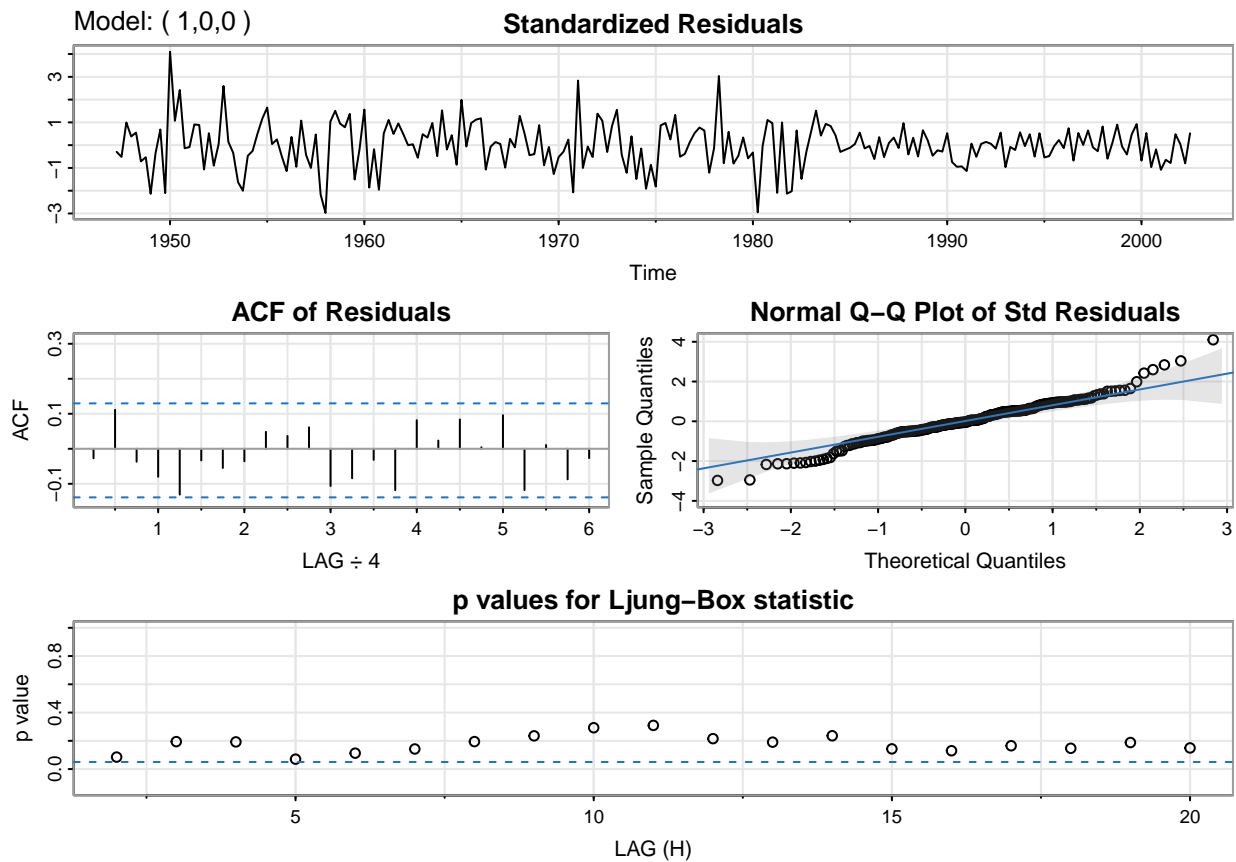


	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]	[,13]
## ACF	0.35	0.19	-0.01	-0.12	-0.17	-0.11	-0.09	-0.04	0.04	0.05	0.03	-0.12	-0.13

```
## PACF 0.35 0.08 -0.11 -0.12 -0.09 0.01 -0.03 -0.02 0.05 0.01 -0.03 -0.17 -0.06
##      [,14] [,15] [,16] [,17] [,18] [,19] [,20] [,21] [,22] [,23] [,24]
## ACF -0.10 -0.11 0.05 0.07 0.10 0.06 0.07 -0.09 -0.05 -0.10 -0.05
## PACF 0.02 -0.06 0.10 0.00 0.02 -0.04 0.01 -0.11 0.03 -0.03 0.00
```

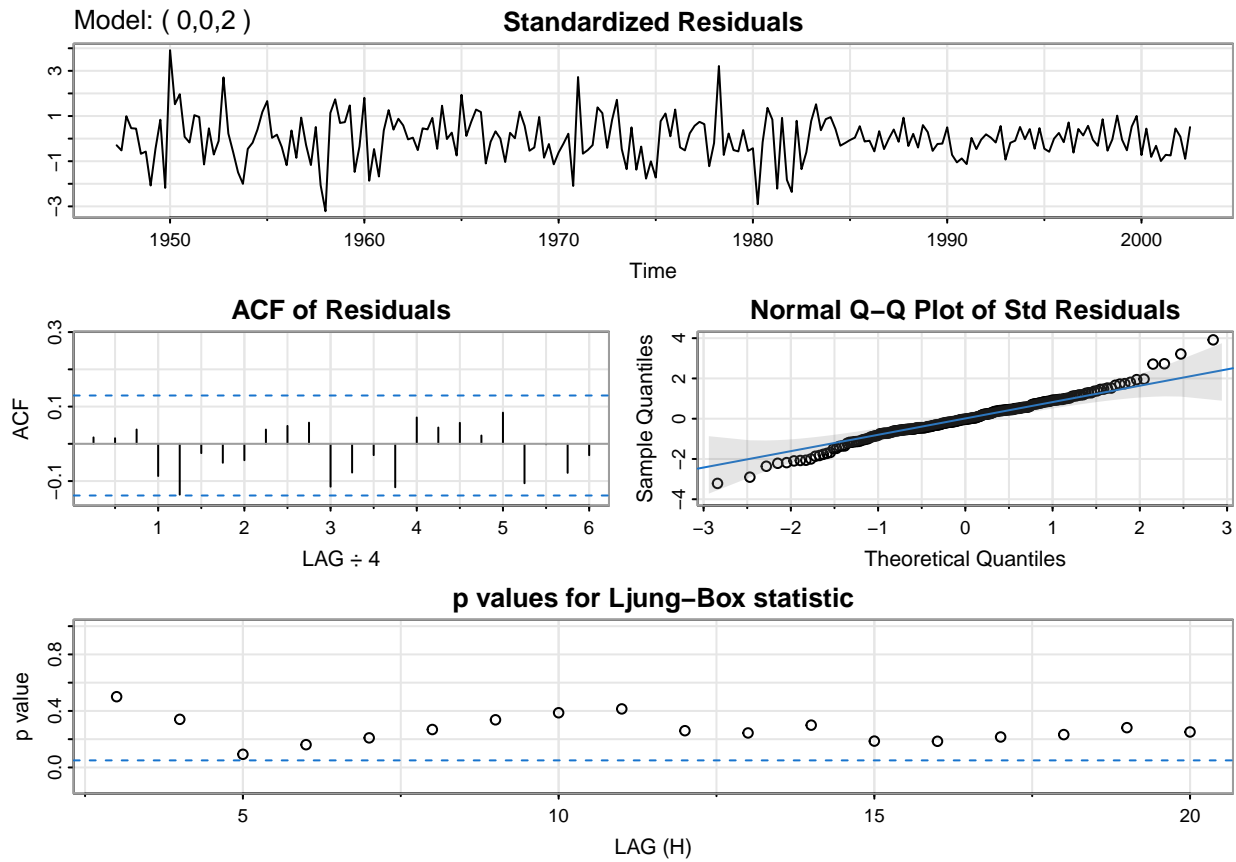
```
sarima(gnpgr, 1, 0, 0) # AR(1)
```

```
## initial value -4.589567
## iter 2 value -4.654150
## iter 3 value -4.654150
## iter 4 value -4.654151
## iter 4 value -4.654151
## iter 4 value -4.654151
## final value -4.654151
## converged
## initial value -4.655919
## iter 2 value -4.655921
## iter 3 value -4.655922
## iter 4 value -4.655922
## iter 5 value -4.655922
## iter 5 value -4.655922
## iter 5 value -4.655922
## final value -4.655922
## converged
## <><><><><><><><><><><><><><>
##
## Coefficients:
##      Estimate      SE t.value p.value
## ar1      0.3467 0.0627  5.5255      0
## xmean    0.0083 0.0010  8.5398      0
##
## sigma^2 estimated as 9.029569e-05 on 220 degrees of freedom
##
## AIC = -6.44694  AICc = -6.446693  BIC = -6.400958
##
```



```
## initial value -4.591629
## iter 2 value -4.661095
## iter 3 value -4.662220
## iter 4 value -4.662243
## iter 5 value -4.662243
## iter 6 value -4.662243
## iter 6 value -4.662243
## iter 6 value -4.662243
## final value -4.662243
## converged
## initial value -4.662022
## iter 2 value -4.662023
## iter 2 value -4.662023
## iter 2 value -4.662023
## final value -4.662023
## converged
## <><><><><><><><><><><>
##
## Coefficients:
## Estimate SE t.value p.value
## ma1 0.3028 0.0654 4.6272 0.0000
## ma2 0.2035 0.0644 3.1594 0.0018
## xmean 0.0083 0.0010 8.7178 0.0000
##
```

```
## sigma^2 estimated as 8.919178e-05 on 219 degrees of freedom
##
## AIC = -6.450133 AICc = -6.449637 BIC = -6.388823
##
```



```
ARMAtoMA(ar=.35, ma=0, 10)
```

```
## [1] 3.500000e-01 1.225000e-01 4.287500e-02 1.500625e-02 5.252187e-03
## [6] 1.838266e-03 6.433930e-04 2.251875e-04 7.881564e-05 2.758547e-05
```