Accidental Deaths in the US 1973-1978

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#Accidental Deaths in the US 1973-1978

A time series giving the monthly totals of accidental deaths in the USA. Bibliotecas necessarias para o projeto

```
require(tseries)
```

```
## Loading required package: tseries
```

```
## Registered S3 method overwritten by 'xts':
##   method     from
##   as.zoo.xts zoo
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
require(FitAR)
```

```
## Loading required package: FitAR
```

```
## Loading required package: lattice
```

```
## Loading required package: leaps
```

```
## Loading required package: ltsa
```

```
## Loading required package: bestglm
```

```
require(forecast)
```

```
## Loading required package: forecast
```

```
## Registered S3 methods overwritten by 'forecast':
##   method             from
##   fitted.fracdiff    fracdiff
##   residuals.fracdiff fracdiff
```

```
##
## Attaching package: 'forecast'
```

```
## The following object is masked from 'package:FitAR':
##
##     BoxCox
```

```
require(FitAR)
```

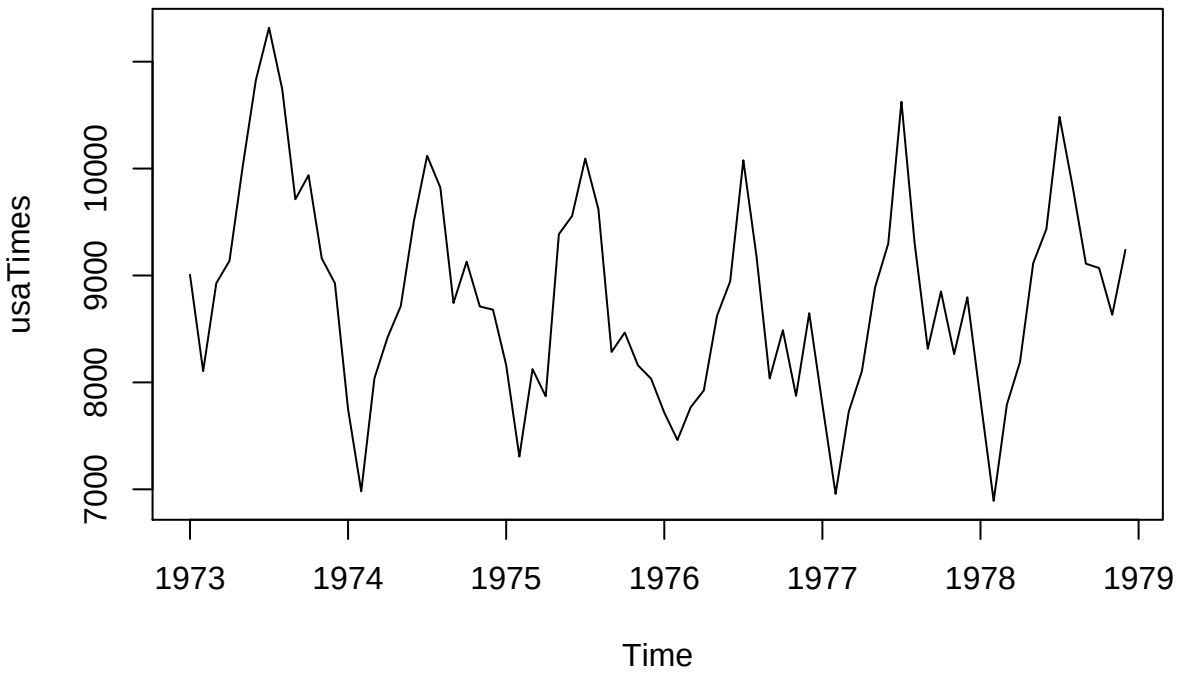
De princípio, vamos conhecer os dados

```
USAccDeaths
```

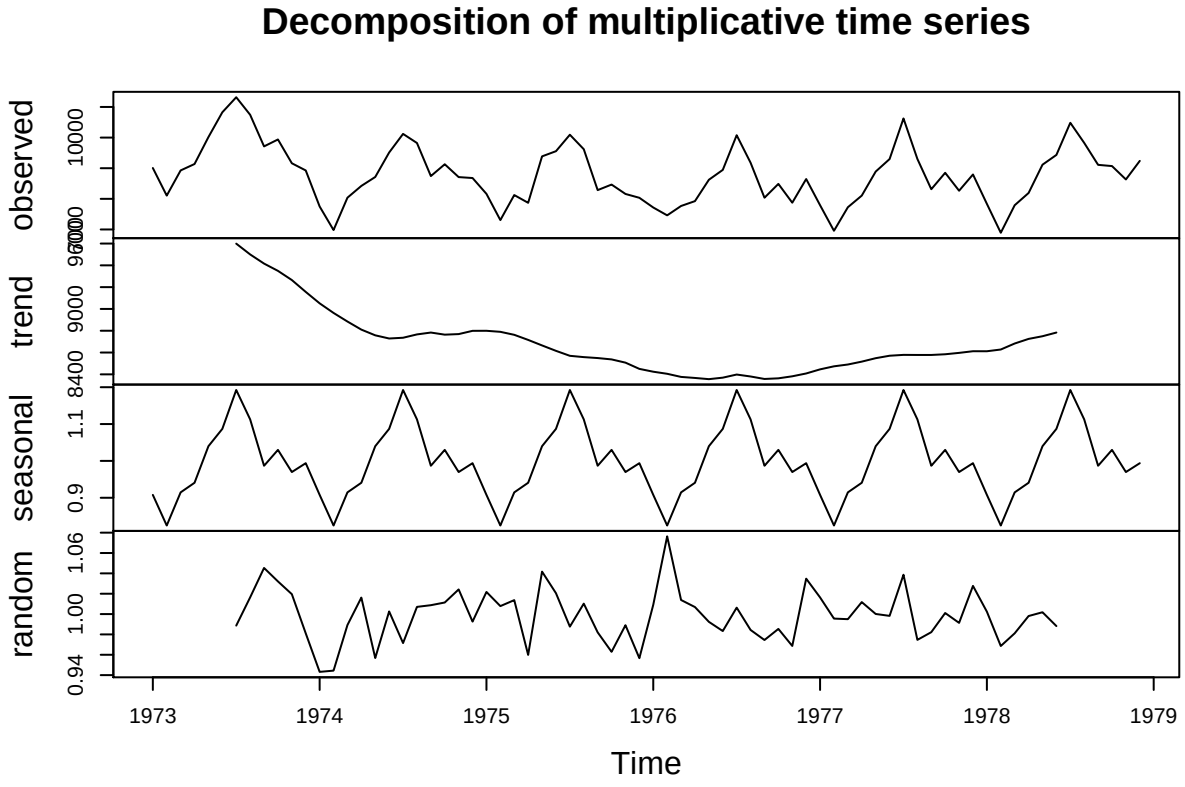
```
##        Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec
## 1973  9007  8106  8928  9137 10017 10826 11317 10744  9713  9938  9161  8927
## 1974  7750  6981  8038  8422  8714  9512 10120  9823  8743  9129  8710  8680
## 1975  8162  7306  8124  7870  9387  9556 10093  9620  8285  8466  8160  8034
## 1976  7717  7461  7767  7925  8623  8945 10078  9179  8037  8488  7874  8647
```

```
## 1977  7792  6957  7726  8106  8890  9299 10625  9302  8314  8850  8265  8796
## 1978  7836  6892  7791  8192  9115  9434 10484  9827  9110  9070  8633  9240
```

```r
usaTimes<-ts(USAccDeaths, frequency = 12, start = c(1973,1))
plot.ts(usaTimes)
```

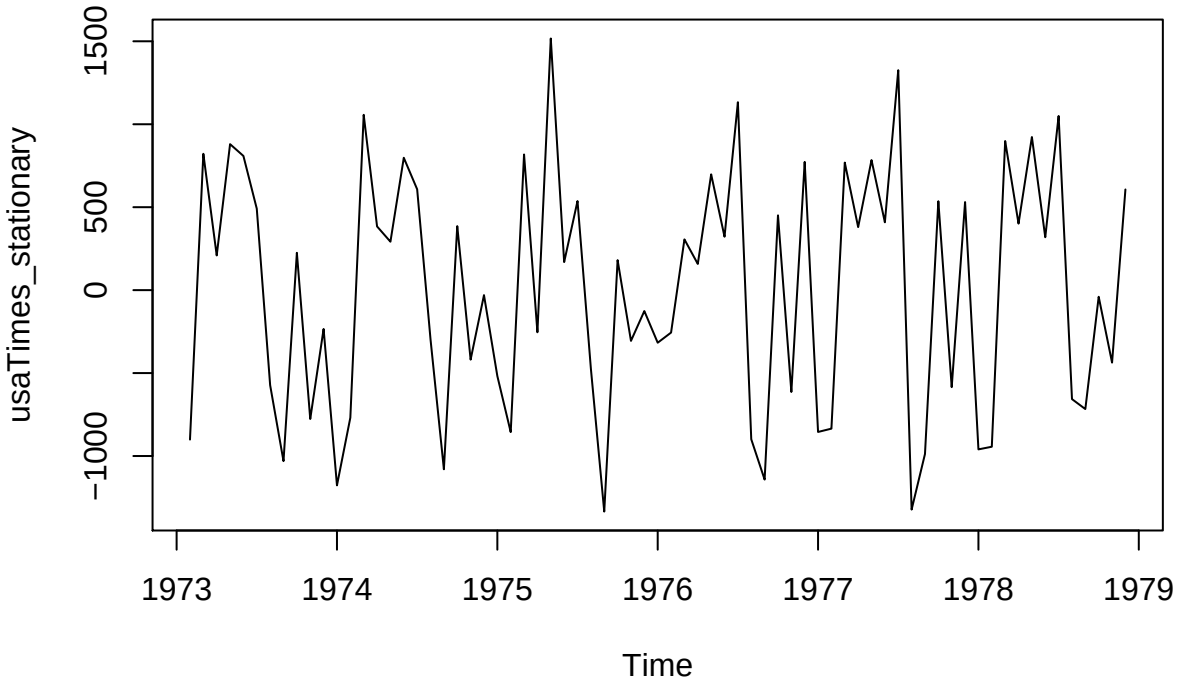



```r
compUsaTime.ts = decompose(usaTimes, type="mult")
plot(compUsaTime.ts)
```

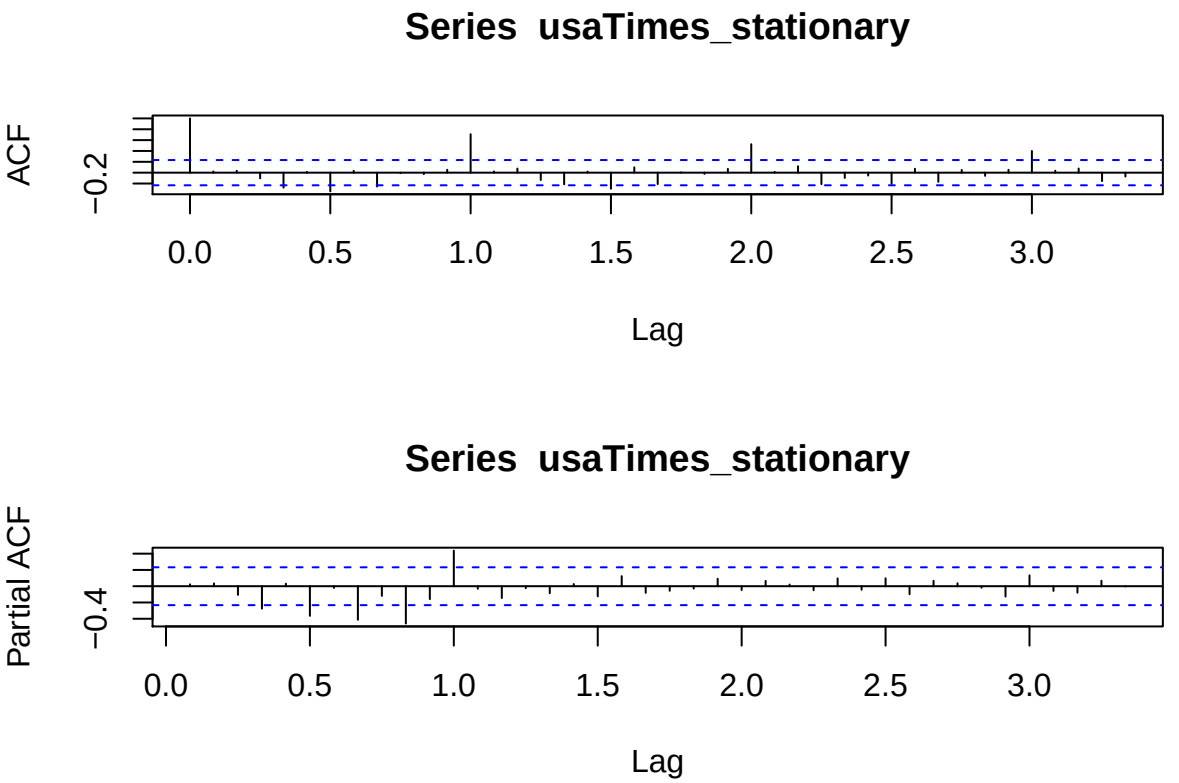



```
usa.Trend <- compUsaTime.ts$trend
usa.Seasonal <- compUsaTime.ts$seasonal
usa.Random <- compUsaTime.ts$random
```

```
x = usaTimes- compUsaTime.ts$seasonal
usaTimes_stationary <- diff(x, differences=1)
plot(usaTimes_stationary)
```



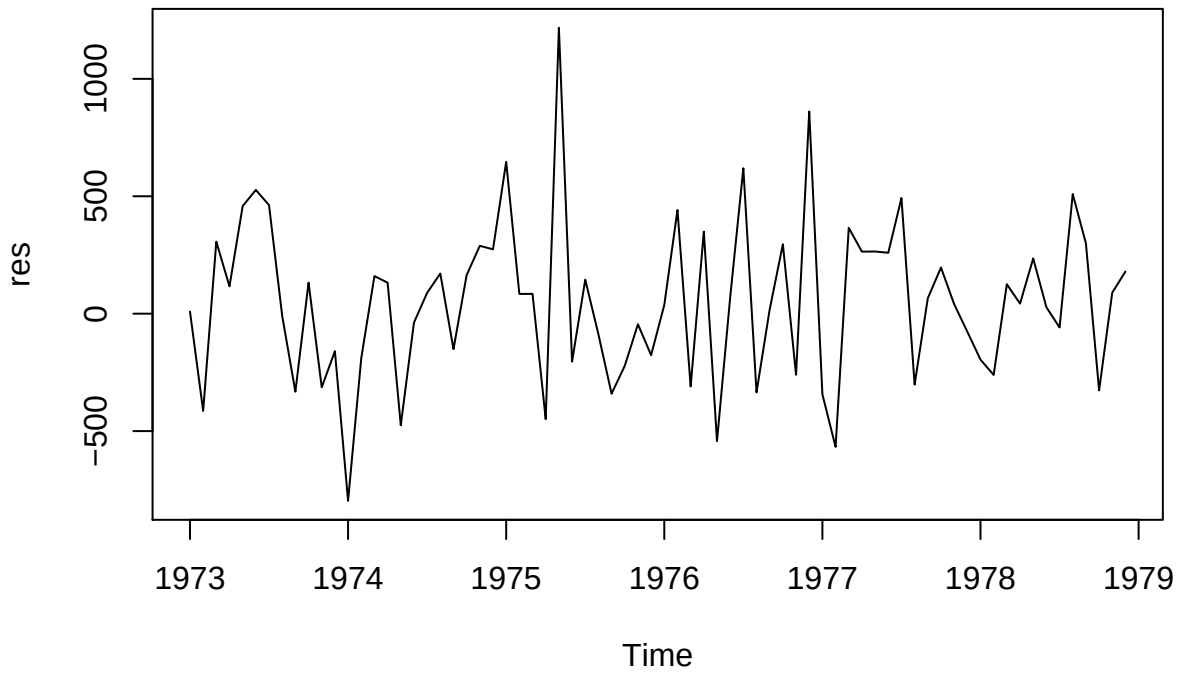

```
layout(1:2)
acf(usaTimes_stationary,lag.max = 40)
pacf(usaTimes_stationary,lag.max = 40)
```



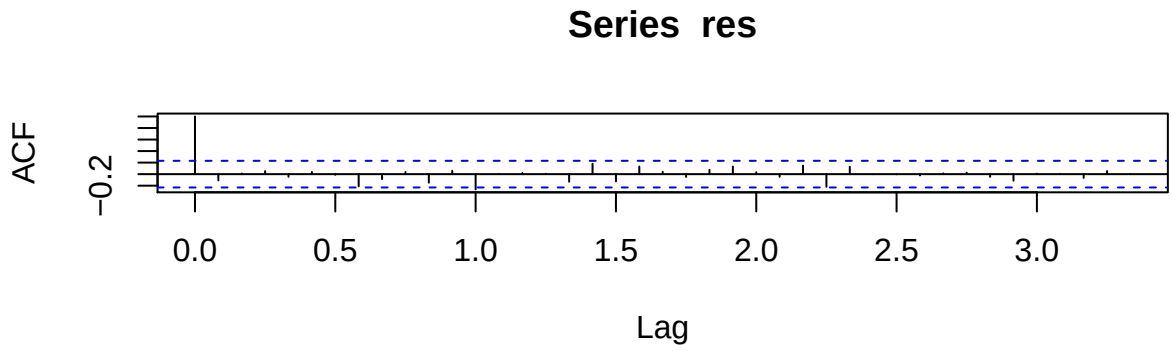
```
fitARIMA = arima(usaTimes, order=c(1,1,1),seasonal= list(order = c(1,0,0), period = 12),
fitARIMA
```

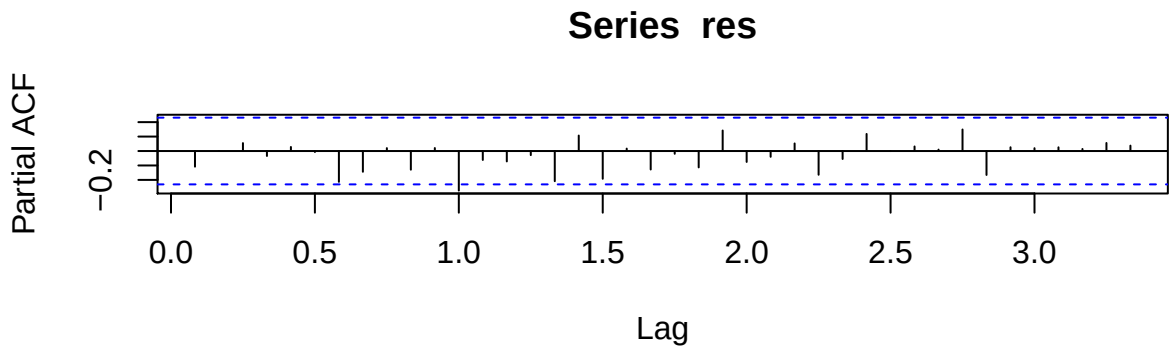
```
##
## Call:
## arima(x = usaTimes, order = c(1, 1, 1), seasonal = list(order = c(1, 0, 0),
##     period = 12), method = "ML")
##
## Coefficients:
##          ar1      ma1    sar1
##       0.6109  -0.8993  0.8724
## s.e.  0.1616   0.0872  0.0475
##
## sigma^2 estimated as 123325:  log likelihood = -525.47,  aic = 1058.94
```

```
res=fitARIMA$residuals
plot(res)
```




```
layout(1:2)
acf(res,lag.max = 40)
pacf(res,lag.max = 40)
```






```
Box.test(res,type="Ljung-Box")
```

```
##
##  Box-Ljung test
##
## data:  res
## X-squared = 0.88487, df = 1, p-value = 0.3469
```

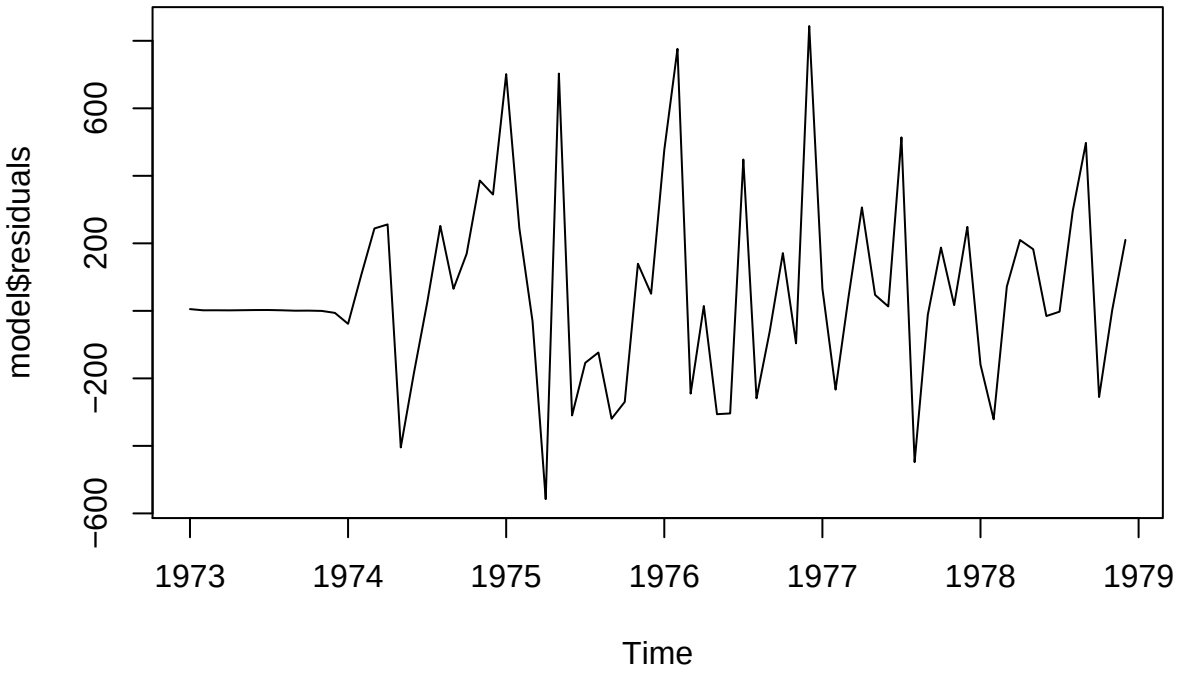
```
model=auto.arima(usaTimes, trace=TRUE)
```

```
##
##  ARIMA(2,1,2)(1,1,1)[12]                    : Inf
##  ARIMA(0,1,0)(0,1,0)[12]                    : 873.7587
##  ARIMA(1,1,0)(1,1,0)[12]                    : 863.7031
##  ARIMA(0,1,1)(0,1,1)[12]                    : 857.3164
##  ARIMA(0,1,1)(0,1,0)[12]                    : 864.7278
##  ARIMA(0,1,1)(1,1,1)[12]                    : Inf
##  ARIMA(0,1,1)(0,1,2)[12]                    : 858.994
##  ARIMA(0,1,1)(1,1,0)[12]                    : 860.3189
##  ARIMA(0,1,1)(1,1,2)[12]                    : Inf
##  ARIMA(0,1,0)(0,1,1)[12]                    : 864.3438
##  ARIMA(1,1,1)(0,1,1)[12]                    : 859.5193
##  ARIMA(0,1,2)(0,1,1)[12]                    : 859.4953
##  ARIMA(1,1,0)(0,1,1)[12]                    : 859.7192
##  ARIMA(1,1,2)(0,1,1)[12]                    : 860.3337
##
##  Best model: ARIMA(0,1,1)(0,1,1)[12]
```

```
model
```

```
## Series: usaTimes
## ARIMA(0,1,1)(0,1,1)[12]
##
## Coefficients:
##           ma1     sma1
##       -0.4303  -0.5528
## s.e.   0.1228   0.1784
##
## sigma^2 estimated as 102860:  log likelihood=-425.44
## AIC=856.88   AICc=857.32   BIC=863.11
```

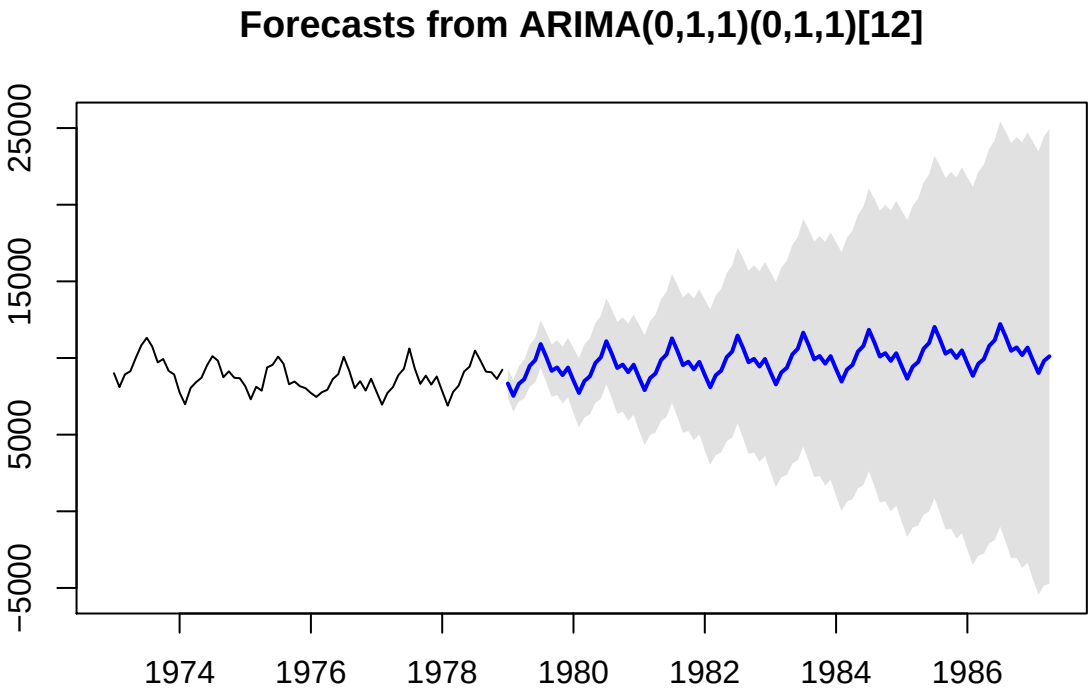
```
plot(model$residuals)
```




```
Box.test(model$residuals,type="Ljung-Box")
```

```
##
##  Box-Ljung test
##
## data:  model$residuals
## X-squared = 0.042995, df = 1, p-value = 0.8357
```

```
predicted_values = forecast(model,h=100, level=c(99.5))
plot(predicted_values)
```


Forecasts from ARIMA(0,1,1)(0,1,1)[12]
25000
15000
5000
−5000
1974
1976
1978
1980
1982
1984
1986