Practical No .03

Aim : Practical of Time-series Forecasting.

Theory :

Time Series Forecasting :

- It is a method for translating past data into estimates of the future.
- Time-series method make forecasts based solely on historical patterns in the data.
- Time-series methods use time as independent variable .

Arima Model :

- ARIMA is an acronym for “Autoregressive Integrated Moving Average”.
- It’s a model used in statistics and economics to measure events that happen over a period of time .
- The model is used to understand past data or predict future data in a series.

Code :

1. import the AirPassengers dataset.

```
>
> data("AirPassengers")
>
```

2. class command will show us the class/type of dataset.

```
> class(AirPassengers)
[1] "ts"
>
```

3. start command will show the first row and first column name of dataset

```
> start(AirPassengers)
[1] 1949    1
>
```

4. end command will show the last row and last column name of dataset

```
> end(AirPassengers)
[1] 1960   12
>
```

5. frequency command will show the frequency of dataset

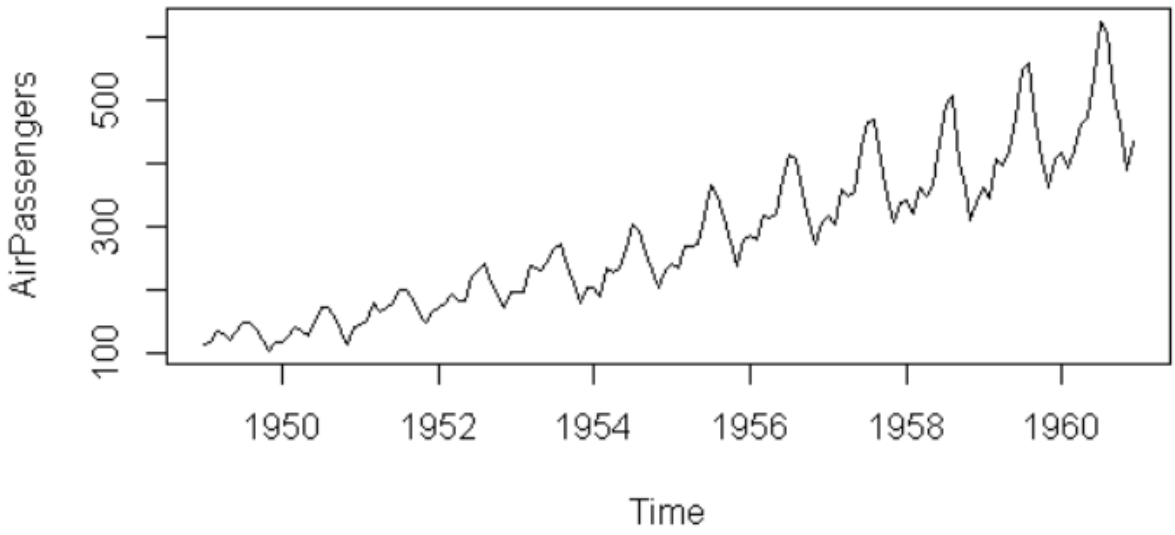
```
>
> frequency(AirPassengers)
[1] 12
>
```

6. summary command will show the basic statictics summary of the dataset

```
> summary(AirPassengers)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  104.0   180.0   265.5   280.3   360.5   622.0
>
```

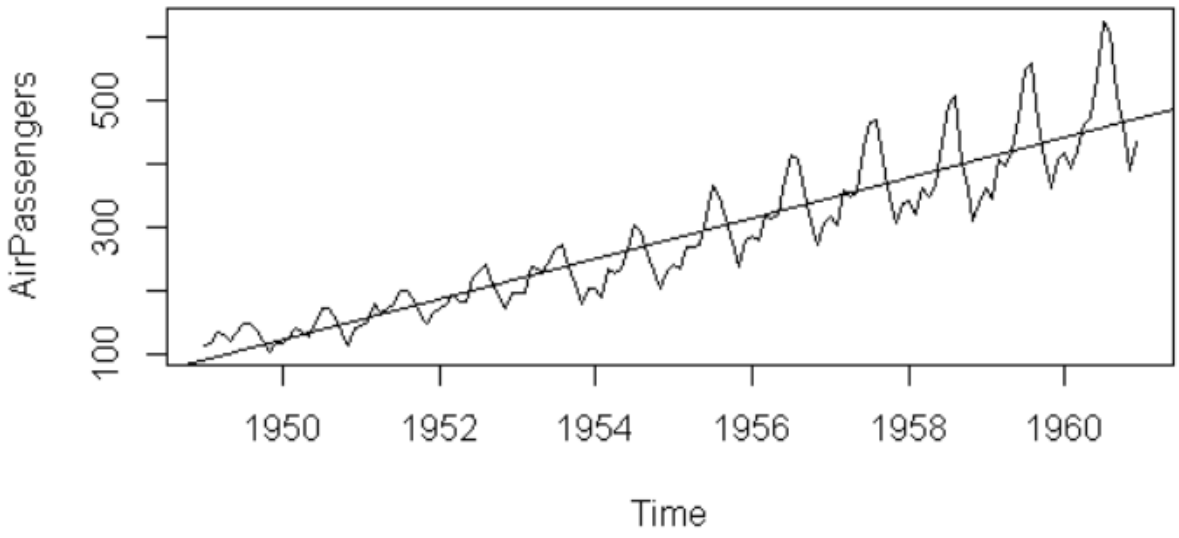
7. plot command will plot a simple line graph of the time series dataset

```
>
> plot(AirPassengers)
>
```



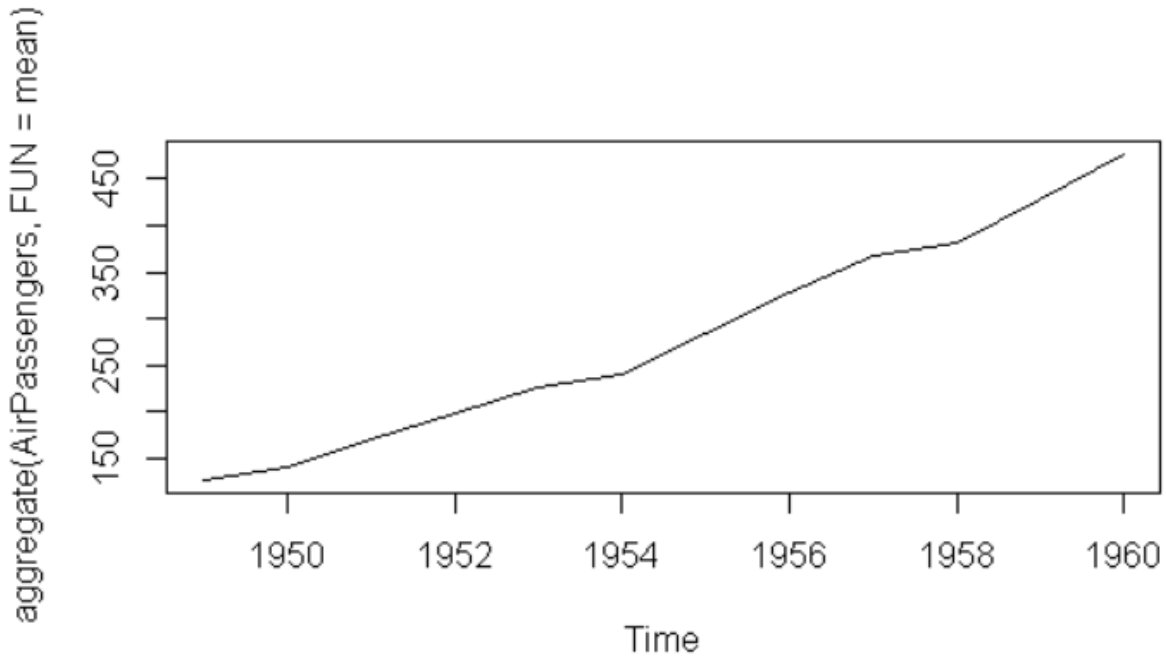
8. plot command will plot a simple line graph of the time series dataset.

```
>
> abline(reg=lm(AirPassengers ~ time(AirPassengers)))
>
```



9.

```
>
> plot(aggregate(AirPassengers,FUN=mean))
>
```

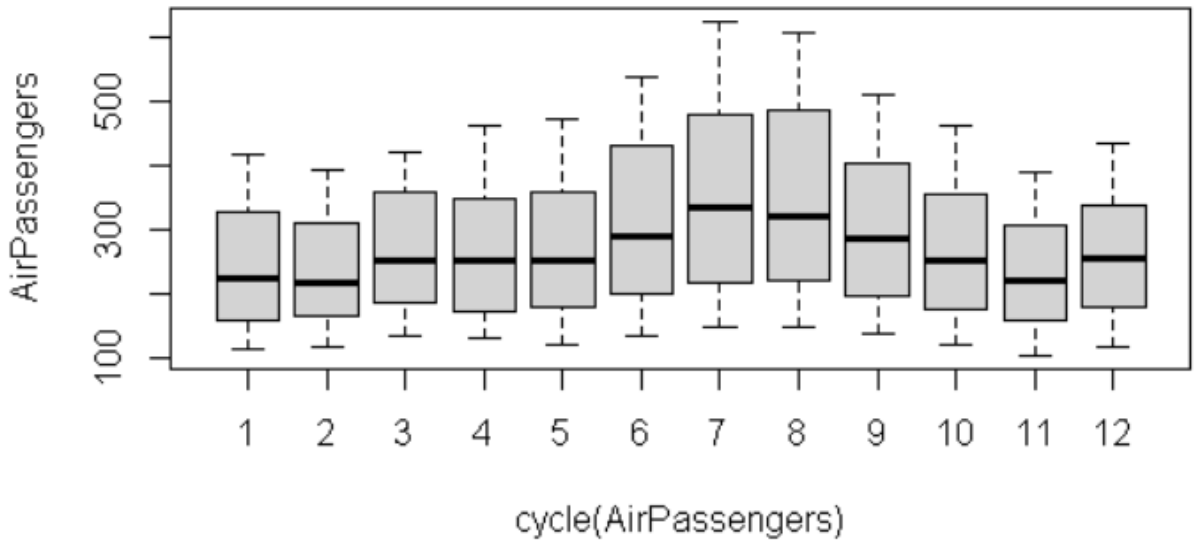


10.cycle

```
>
> cycle(AirPassengers)
     Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1949   1   2   3   4   5   6   7   8   9  10  11  12
1950   1   2   3   4   5   6   7   8   9  10  11  12
1951   1   2   3   4   5   6   7   8   9  10  11  12
1952   1   2   3   4   5   6   7   8   9  10  11  12
1953   1   2   3   4   5   6   7   8   9  10  11  12
1954   1   2   3   4   5   6   7   8   9  10  11  12
1955   1   2   3   4   5   6   7   8   9  10  11  12
1956   1   2   3   4   5   6   7   8   9  10  11  12
1957   1   2   3   4   5   6   7   8   9  10  11  12
1958   1   2   3   4   5   6   7   8   9  10  11  12
1959   1   2   3   4   5   6   7   8   9  10  11  12
1960   1   2   3   4   5   6   7   8   9  10  11  12
>
```

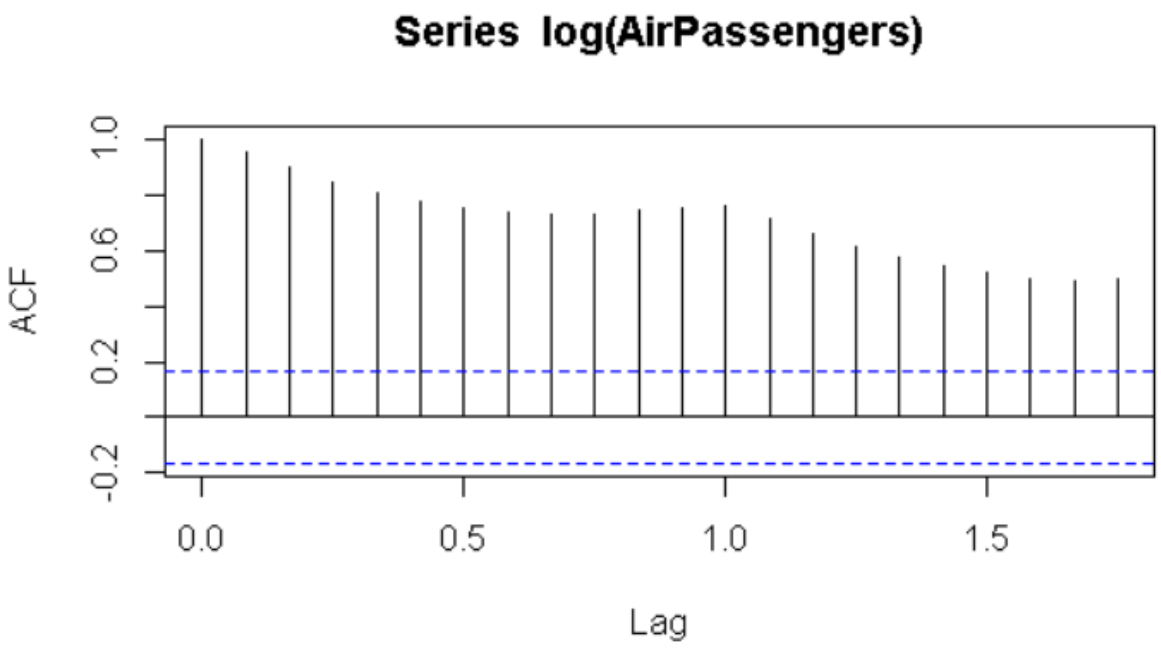
11. boxplot

```
>
> boxplot(AirPassengers ~ cycle(AirPassengers))
>
```



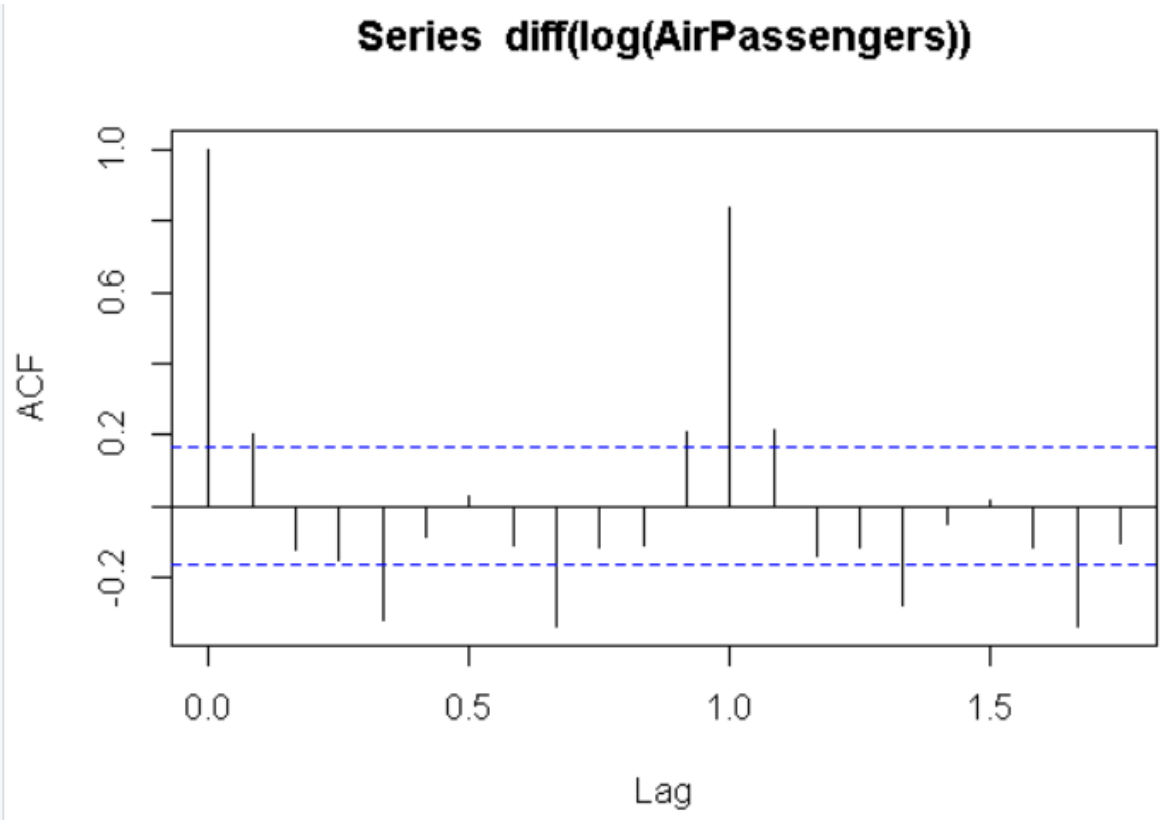
12.

```
>
> acf(log(AirPassengers))
>
```



13.

```
>
> acf(diff(log(AirPassengers)))
>
```



14. Next we will find arima value to predict the future values and plot a time series plot of the same.

Note : ARIMA is an acronym that stands for AutoRegressive Integrated Moving Average

```
> (fit <- arima(log(AirPassengers),c(0,1,1),seasonal = list(order=c(0,1,1),period=12)))

Call:
arima(x = log(AirPassengers), order = c(0, 1, 1), seasonal = list(order = c(0,
    1, 1), period = 12))

Coefficients:
          ma1     sma1
      -0.4018  -0.5569
s.e.   0.0896   0.0731

sigma^2 estimated as 0.001348:  log likelihood = 244.7,  aic = -483.4
>
```

15 .

```
> pred <- predict(fit,n.ahead = 10*12)
> ts.plot(AirPassengers,2.718^pred$pred,log="y",lty=c(1,3))
>
```