'USAccDeaths' dataset

Quiz, 8 questions

8/8 points (100.00%)

Congratulations! You passed!

Next Item

1 / 1 points

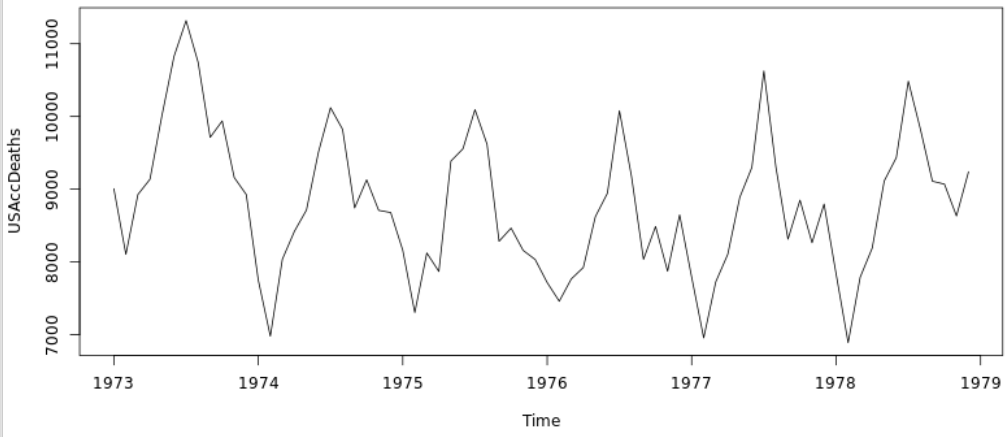
1.
This Quiz has several Questions all of which are related and steps towards modeling the time series titled 'USAccDeaths' in 'dataset' package in R.

Plot the time series titled 'USAccDeaths' in the code block below.

```
1  plot(USAccDeaths)
```

Run

Reset



Which of the followings are plausible?

- [ ] There is a clear upward trend.

Un-selected is correct

- [x] Time series is not stationary since there is a seasonal trend.

Correct
Correct!

There is definitely a seasonal trend which repeats itself every 12 data points.
This time series is a monthly time series.

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- [ ] Peaks in the series happen every winter around February.

Un-selected is correct

- [x] It is a monthly time series with a span of seasonality 12.

Correct
Correct!

help(USAacDeaths) routine gives more information about the series including being monthly time series.

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1 / 1 points

2.
We first get rid of the seasonal trend by differencing the values at the same month of each year. Plot the seasonally differenced time series in the code block below.

```
1  plot(diff(USAccDeaths,12))
```

Run

Reset

What can be said about the plot?

- [ ] The seasonally differenced time series is stationary.

Un-selected is correct

There is a clear upward trend.

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Correct
Correct!

---

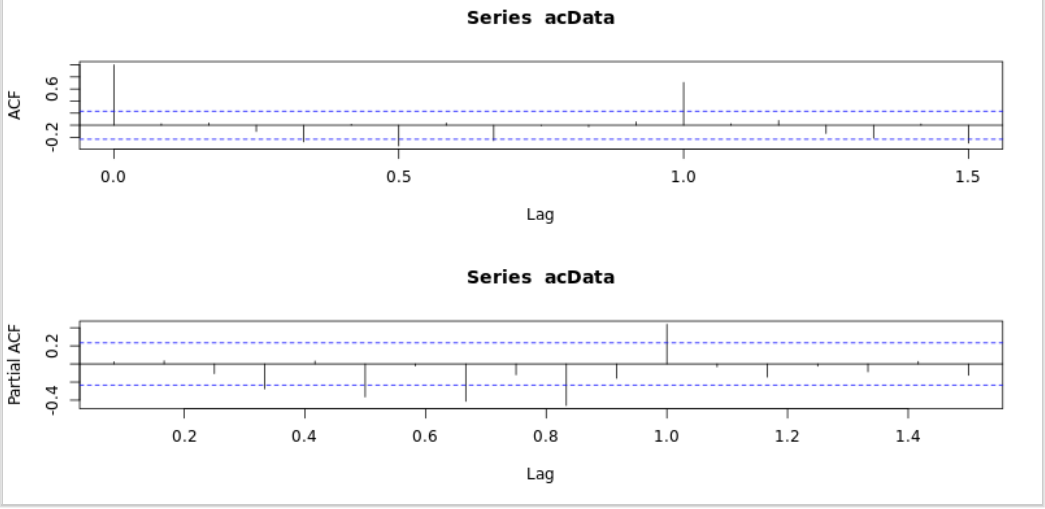
1 / 1 points

3.
We de-trend the seasonally differenced time series by taking non-seasonal differencing, diff(), and call the obtained time series 'acData'. Obtain ACF and PACF of 'acData' in the code block below.

```
1  par(mfrow=c(2,1))
2
3  # obtain acf and pacf below
4  acData <- diff(USAccDeaths)
5  acf(acData)
6  pacf(acData)
```

Run

Reset



What do they suggest about the order of AR and seasonal AR terms?

The significant autocorrelation coefficient at lag 12 suggests the order of seasonal AR term, $P \leq 1$.

Un-selected is correct

The significant partial autocorrelation coefficient at lag 12 suggests the order of seasonal AR term, $P \leq 1$.

Correct
Correct!

Significant adjacent lags in PACF suggest the order of AR terms, $p \leq 2$.

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Correct
Correct!

Significant adjacent lags in ACF suggest the order of AR terms, $p \leq 1$.

Un-selected is correct

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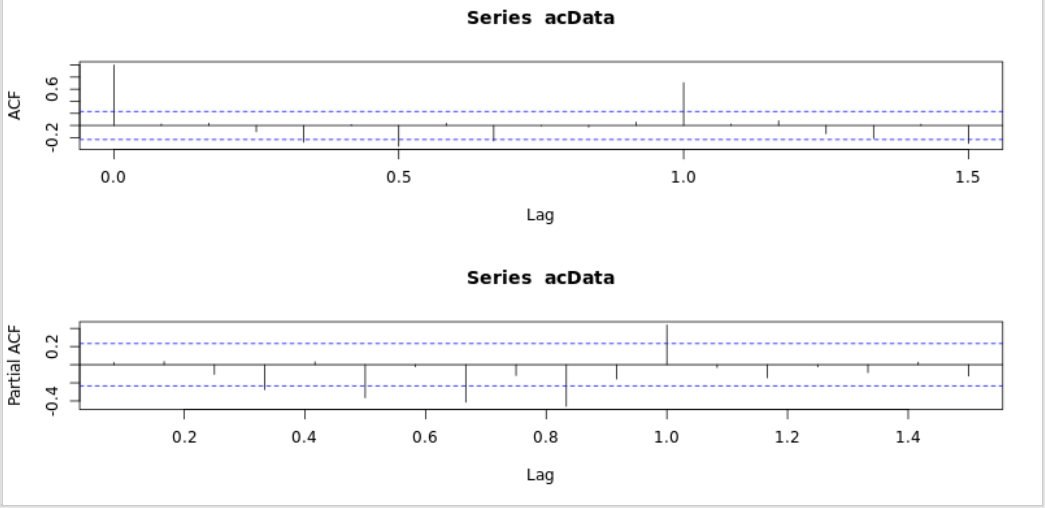
1 / 1 points

4.
Obtain ACF and PACF of 'acData' in the code block below.

```
1  par(mfrow=c(2,1))
2
3  # obtain acf and pacf below
4  acData <- diff(USAccDeaths)
5  acf(acData)
6  pacf(acData)
7
```

Run

Reset



What do they suggest about the order of MA and seasonal MA terms?

The significant autocorrelation coefficient at lag 12 suggests the order of seasonal MA term, $Q \leq 1$.

Correct
Correct!

Significant adjacent lags in ACF suggest the order of MA terms, $q \leq 1$.

Correct

Correct!

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- [x] Significant adjacent lags in PACF suggest the order of MA terms, $q \leq 2$.

Un-selected is correct

- [ ] The significant partial autocorrelation coefficient at lag 12 suggests the order of seasonal MA term, $Q \leq 1$.

Un-selected is correct

---

1 / 1 points

5.

We try few different models, and choose the model with smallest AIC: SARIMA $(0,1,1,0,1,1)_{12}$. If X_t=USAccDeaths, which of the followings is/are the fitted model?

- [x] $X_t = X_{t-1} + X_{t-12} - X_{t-13} + Z_t - 0.4303Z_{t-1} - 0.5528Z_{t-12} + 0.2379Z_{t-13}$ where $\sigma_Z^2 = 99347$.

Correct

Correct!

- [ ] $(1 - 0.4303B)(1 - 0.5528B^{12})X_t = (1 - B)(1 - B^{12})Z_t$ where $\sigma_Z^2 = 99347$.

Un-selected is correct

- [x] $(1 - B)(1 - B^{12})X_t = (1 - 0.4303B)(1 - 0.5528B^{12})Z_t$ where $\sigma_Z^2 = 99347$.

Correct

Correct!

- [ ] $X_t = 0.4303X_{t-1} + 0.5528X_{t-12} - 0.2379X_{t-13} + Z_t - Z_{t-1} - Z_{t-12} + Z_{t-13}$ where $\sigma_Z^2 = 99347$.

Un-selected is correct

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1 / 1 points

8/8 points (100.00%)

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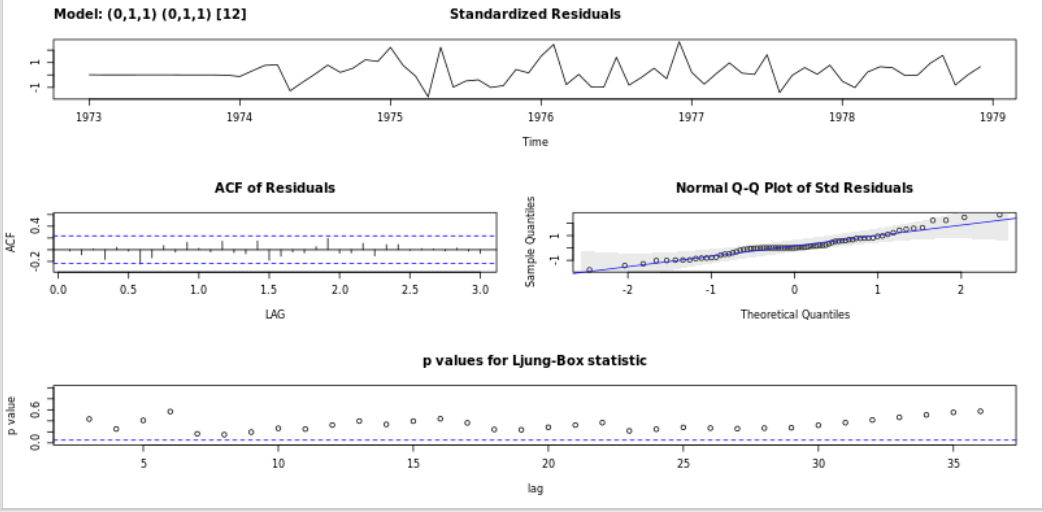
6.

We carry residual analysis by using sarima() routine from 'astsa' package.

```
1  library(astsa)
2
3  sarima(USAccDeaths, 0,1,1,0,1,1,12)
```

Run

Reset



What can be said about the residuals?

- [x] ACF shows no significant autocorrelation in the residuals.

Correct

Correct!

- [x] There is a systematic departure from linearity in QQ-plot which implies that residuals have a heavier tail compared to the Gaussian distribution.

Correct

Correct!

- [x] p-values from Ljung-Box test are high meaning that there is no significant autocorrelation left in the residuals.

Correct

Correct!

- [ ] There is a strong evidence against the whiteness of the residuals.

Un-selected is correct

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1 / 1 points

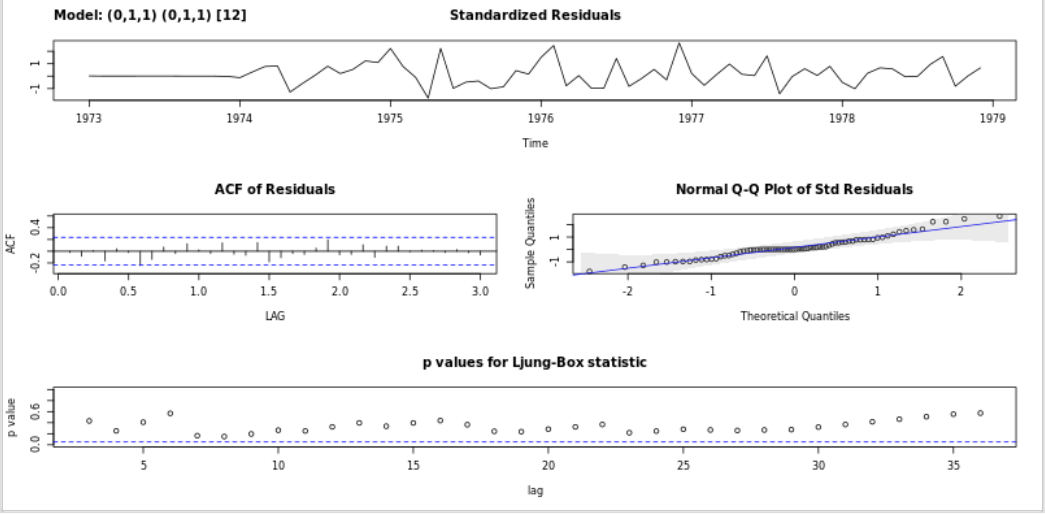
7.

Obtain the p-values of the coefficients in the fitted model in the code block below.

```
1  library(astsa)
2
3  model<-sarima(USAccDeaths, 0,1,1,0,1,1,12)
4  model$ttable
5
```

Run

Reset



What do they mean?

- (●) p-values are 0.0008 and 0.0028 for MA and seasonal MA coefficients, respectively. The fact that they are both less than any reasonable significant level, both coefficients (terms) are significant.

Correct

Correct!

- ( ) p-values are 0.1228 and 0.1784 for MA and seasonal MA coefficients, respectively. The fact that they are both higher than any reasonable significant level, none of the coefficients (terms) are significant.

1 / 1 points

8.

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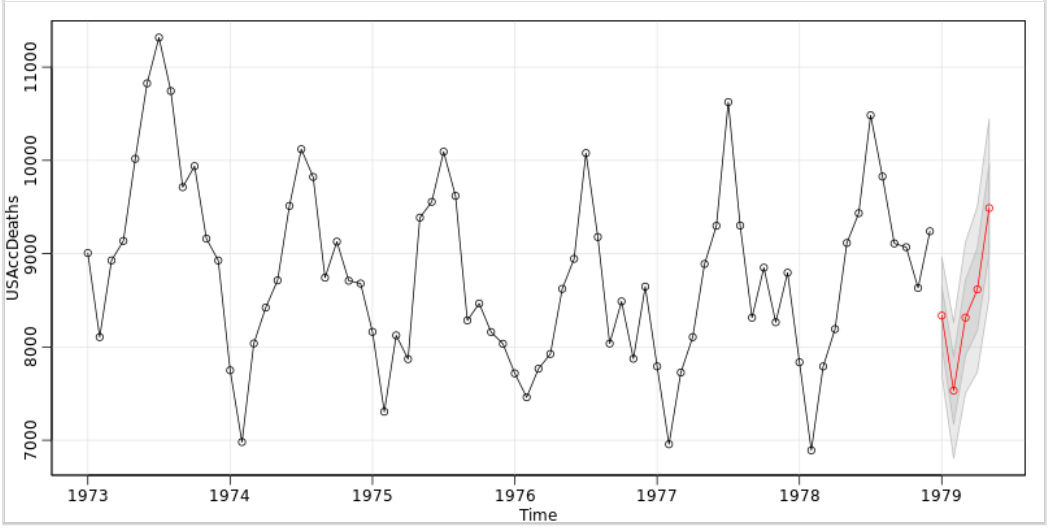
Use sarima.for() routine in the code block below to obtain the point forecast for the number of accidental deaths in the March of 1979. The answer is rounded.

```
1  library(astsa)
2
3  ### Write the arguments of the routine below
4  (sarima.for(USAccDeaths, 5, 0,1,1,0,1,1,12))
```

Run

Reset



- (●) 8315

Correct
Correct!

- ( ) 7532
- ( ) 7791
- ( ) 8336