'BJsales' dataset

11/12 points (91.66%)

Quiz, 12 questions

✓ Congratulations! You passed!

Next Item

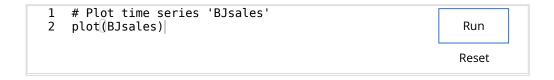


1/1 points

1

This Quiz has several questions all of which are related and are steps toward modeling the time series titled 'BJsales' in 'datasets' package in R.

Plot the time series in the code block below.



Which one of the following is plausible?



There are ups and downs with a general upward trend.

Correct

Correct!



There is no trend at all.

Un-selected is correct



Time series is not stationary.

Correct

Correct!

There is a trend which means mean is changing.



Time series is stationary.

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2.

Plot the differenced data below. Does it seem stationary?



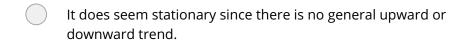


It does not seem to be stationary since there are still upward or downward trends in different parts of the time plot.

Correct

Correct!

There is, for example, an upward trend between (50,100) but a downward trend between (100,150). That means the mean is changing.





1/1 points

3.

To get rid of a still remaining trend, we apply one more differencing. Plot the

twice differenced time series in the code block below. 'BJsales' dataset 11/12 points (91.66%) plot(diff(diff(BJsales))) Quiz, 12 questions Run Reset Which one or more of the following are plausible? Mean level seems to be changing. **Un-selected** is correct There is no systematic change in mean. Correct Correct! Mean level seems to be constant, around 0. Variance towards the end of the series seems to be different from the variance in the other parts of the plot. Correct Correct! It seems that variance is smaller towards the end of the plot. One may say that difference in the change of the variance is not high, and thus can be ignored.

1/1 points

4.

Find the PACF of diff(diff(BJsales)) in the code block below. Which lags are significant?

significant? 'BJsales' dataset 11/12 points (91.66%) pacf(diff(diff(BJsales))) Quiz, 12 questions Run Reset Lag 1, Lag 2, Lag 3, Lag 10, Lag 19 Correct Correct! One might say that Lag 19 is barely significant. Lag 1, Lag 8, Lag 11 Lag 1, Lag 2, Lag 3 1/1 points Find the ACF of diff(diff(BJsales)) in the code block below. Which lags are significant? 1 acf(diff(diff(BJsales))) Run Reset Lag 1, Lag 8, Lag 11 Correct Correct! Lag 8 and Lag 11 are barely significant.

Lag 1, Lag 2, Lag 3, Lag 10, Lag 19

Lag 1

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1/1 points

6.

What does ACF suggest?



Keeping parsimony principle in mind, AR term has order of 0 or 1.

Un-selected is correct



If we ignore barely significant lags, the order of MA term can be 0 or 1.

Correct

Correct!



Keeping parsimony principle in mind, the order of MA term can be 0 or 1.

Correct

Correct!



1/1 points

7.

What does PACF suggest?



Keeping parsimony principle in mind, the order of AR terms can be 0,1,2 or 3.



Correct

Correct!



If we ignore barely significant lags, the order of MA terms can be 0, 1,2 or 3.



Un-selected is correct

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0/1 points

8.

Now we try few different models and compare their AIC values.

```
d=2
 1
 2
    for(p in 1:4){
 3
      for(q in 1:2){
 4
             if(p+d+q \le 8)
 5
               model < -arima(x=BJsales, order = c((p-1),d,(q-1)))
 6
               pval<-Box.test(model$residuals, lag=log(length</pre>
                 (model$residuals)))
 7
               sse<-sum(model$residuals^2)</pre>
               cat(p-1,d,q-1, 'AIC=', model$aic,
   pval$p.value,'\n')
 8
                                                     SSE=',sse,
                                                                  p-VALUE=',
                                                       Run
 9
             }
10
                                                      Reset
11
0 2 0 AIC= 577.6777 SSE= 423.7908 p-VALUE= 7.610494e-07
0 2 1 AIC= 517.1371
                      SSE= 276.2293
                                      p-VALUE= 0.9632467
1 2 0 AIC= 541.9646 SSE= 327.92 p-VALUE= 0.003606979
1 2 1 AIC= 518.9734 SSE= 275.8554
                                      p-VALUE= 0.941776
2 2 0 AIC= 532.2986 SSE= 302.7467
                                      p-VALUE= 0.05824473
                      SSE= 274.0474
2 2 1 AIC= 520.2684
                                      p-VALUE= 0.7955439
3 2 0 AIC= 524.7648
                      SSE= 283.4941
                                      p-VALUE= 0.7035291
3 2 1 AIC= 519.4182 SSE= 264.0684 p-VALUE= 0.6948066
```

Which model has the smallest AIC value?

- ARIMA(0,2,1)
- ARIMA(3,2,1)
- ARIMA(1,2,1)

This should not be selected

This model has relatively small AIC and SSE values, but not smallest.



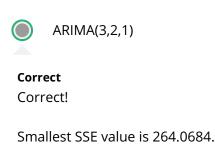
1/1

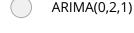
points

9

```
d=2
                          for(p in 1:4){
'BJsales' datasat
                            for(q in 1:2){
                                  if(p+d+q \le 8){
                                                                                           11/12 points (91.66%)
                                     model < -arima(x=BJsales, order = c((p-1),d,(q-1)))
Quiz, 12 questions
                      6
                                     pval<-Box.test(model$residuals, lag=log(length</pre>
                                       (model$residuals)))
                      7
                                     sse<-sum(model$residuals^2)</pre>
                                     cat(p-1,d,q-1, 'AIC=', model$aic, 'SSE=',sse,' p-VALUE=',
                      8
                                       pval$p.value,'\n')
                                                                       Run
                      9
                                  }
                     10
                                }
                                                                       Reset
                     11
```

Which model has the smallest SSE (sum of squared errors) value?









1/1 points

10.

We fit ARIMA(0,2,1), and look at the time plot, ACF and PACF of the residuals.

```
1 model<-arima(BJsales, order=c(0,2,1))
2
3 par(mfrow=c(2,2))
4
5 plot(model$residuals)
6 acf(model$residuals)
7 pacf(model$residuals)
8 qqnorm(model$residuals)</pre>
Reset
```

Is there compelling evidence against the whiteness of the residuals?



No, since QQ-plot seems linear.

Correct

Correct!



No, since ACF nad PACF has no significant lags.

Correct

'BJsales' datasetect!

Quiz, 12 questions

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1/1 points

Let X_t =BJsales and $Y_t=diff(diff(BJsales))$. What is the fitted model for Y_t ?



$$Y_t = Z_t - 0.7480 Z_{t-1}$$
 and $\sigma_Z = 1.866.$

Un-selected is correct



$$Y_t = (1-0.7480B)Z_t$$
 and $\sigma_Z^2 = 1.866.$

Correct

Correct!



$$Y_t=(1-0.7480B)Z_t$$
 and $\sigma_Z=1.866$.

Un-selected is correct



$$lacksquare$$
 $Y_t = Z_t - 0.7480 Z_{t-1}$ and $\sigma_Z^2 = 1.866.$



Correct

Correct!



1/1 points

Let X_t =BJsales and $Y_t=diff(diff(BJsales)).$ What is the fitted model for X_t ?



$$X_t = 2X_{t-1} - X_{t-2} + Z_t - 0.7480Z_{t-1}$$
 and $\sigma_Z^2 = 1.866$.

Correct

'BJsales' datasetect!

11/12 points (91.66%)

Quiz, 12 questions



$$lacksquare$$
 $(1-B)^2X_t=Z_t-0.7480Z_{t-1}$ and $\sigma_Z^2=1.866.$

Correct

Correct!

$$Y_t = (1 - B)^2 X_t.$$



$$(1-2B+B^2)X_t = (1-0.7480B)Z_t$$
 and $\sigma_Z^2 = 1.866.$

Correct

Correct!

$$\nabla^2 = 1 - 2B + B^2.$$



$$abla^2 X_t = Z_t - 0.7480 Z_{t-1}$$
 and $\sigma_Z^2 = 1.866$.

Correct

Correct!

$$1 - B = \nabla$$
.





