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Specialty: International Commerce & Finance
Module: Time Series Analysis
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Exercises series N°3 Cont……

Exercise 1

1. **In a simple linear regression model, what is the purpose of testing the hypothesis for the slope (β_1)?**
   A) To determine if there is a significant relationship between the independent and the dependent variable.
   B) To check if the model has high predictive power.
   C) To determine if the intercept is significantly different from zero.
   D) To ensure the residuals are normally distributed.
2. **Which of the following hypotheses would you test to determine if the independent variable has a significant effect on the dependent variable in a simple linear regression?**
   A) $H_0:\beta_1=0$ *vs.* $H_a:\beta_1\neq0$
   B) $H_0:\beta_0=0$ *vs.* $H_a:\beta_0\neq0$
   C) $H_0:R^2=0$ *vs.* $H_a:R^2\neq0$
   D) H_0*:Residual mean=0 vs.* H_a*:Residual mean≠0*
3. **If the p-value for the slope coefficient β_1 in a simple linear regression is less than 0.05, what does this imply?**
   A) The independent variable is significantly related to the dependent variable at the 5% significance level.
   B) The independent variable has no effect on the dependent variable.
   C) The residuals are normally distributed.
   D) The intercept is significantly different from zero.
4. **In hypothesis testing for simple linear regression, what does a high p-value (e.g., p > 0.05) indicate about the relationship between the independent and dependent variable?**
   A) The independent is likely to have a significant impact on the dependent variable.
   B) There is insufficient evidence to conclude that the independent affects the dependent variable.
   C) The intercept is significantly different from zero.
   D) The regression model has high predictive accuracy.
5. **Which test statistic is commonly used to test the significance of the slope (β1β1) in a simple linear regression model?**
   A) Chi-square test
   B) Z-test
   C) T-test
   D) ANOVA test
6. **In a simple linear regression, what does the R^2 value represent?**

A) The probability that the slope is different from zero
B) The proportion of variation in the dependent variable explained by the independent
C) The correlation between the independent and the dependent variable
D) The significance level of the intercept

7. **What does an R^2 value of 0.85 indicate in a regression model?**
A) 85% of the variance in the independent variable is explained by the dependent variable
B) 85% of the variation in the dependent variable is explained by the independent variable
C) The model is 85% accurate
D) The correlation between the independent and dependent is 0.85

8. **If the R^2 value of a simple linear regression model is close to 0, what does this imply?**
A) The independent variable explains most of the variance in the dependent variable.
B) There is a strong linear relationship between the independent and dependent variable.
C) The independent variable explains very little of the variance in the dependent variable.
D) The model is highly accurate.

9. **Which of the following best describes a simple linear regression model?**
A) A model with one dependent variable and one independent variable
B) A model with multiple dependent variables and one independent variable
C) A model with one dependent variable and multiple independent variables
D) A model with multiple dependent variables and multiple independent variables

10. **In the context of simple linear regression, what is the meaning of a p-value associated with the slope coefficient?**
A) It indicates the probability of observing the data if the null hypothesis is true
B) It shows the percentage of data points that lie on the regression line
C) It represents the strength of the relationship between independent and dependent variable
D) It measures the goodness of fit for the entire model

11. **Which of the following is a valid interpretation if the p-value for the slope is less than 0.05 in a simple linear regression model?**
A) The independent variable does not significantly affect the dependent variable.
B) There is strong evidence to reject the null hypothesis that the slope is zero.
C) The model is perfect in predicting the dependent variable.
D) The independent variable explains all the variability in the dependent variable.

12. **What does a negative value of the slope (β_1) in a simple linear regression indicate?**
A) The independent variable has no effect on the dependent variable.
B) There is a positive relationship between the independent and dependent variable.
C) There is a negative relationship between the independent and dependent variable.
D) The intercept is also negative.

13. **Which of the following statements about R^2 is correct?**
A) R^2 can never decrease as more independents are added to the model.
B) R^2 measures the average difference between observed and predicted values.
C) R^2 is always between 0 and 1, where 1 indicates a perfect fit.
D) A high R^2 always indicates that the model is a good independent for new data.

Exercise 2

Suppose you want to build a simple linear regression model to establish the relationship between interest rate and the oil price. The dataset is as follows:

month	intereset X	oil price (Y)
sept-18	2,19	75,36
oct-18	2,2	76,73
nov-18	2,27	62,32
déc-18	2,4	53,96
janv-19	2,4	56,58
févr-19	2,41	61,13
mars-19	2,41	63,79
avr-19	2,42	68,58
mai-19	2,39	66,83
juin-19	2,28	59,76
juil-19	2,4	61,48
août-19	2,13	57,67
sept-19	2,04	60,04
oct-19	1,83	57,27
nov-19	1,55	60,4
déc-19	1,55	63,35
janv-20	1,55	61,63
févr-20	1,58	53,35
mars-20	0,55	32,2
avr-20	0,05	21,04
mai-20	0,05	30,38
juin-20	0,08	39,46
juil-20	0,09	42,07
août-20	0,1	43,44
sept-20	0,09	40,6
oct-20	0,09	39,9
nov-20	0,09	42,3
déc-20	0,09	48,73
janv-21	0,09	53,6
févr-21	0,08	60,46
mars-21	0,07	63,83
avr-21	0,07	62,95
mai-21	0,06	66,4
juin-21	0,08	71,8
juil-21	0,1	73,28
août-21	0,09	68,87
sept-21	0,08	72,8
oct-21	0,08	82,06

nov-21	0,08	79,92
déc-21	0,08	72,87
janv-22	0,08	83,92
févr-22	0,08	93,54
mars-22	0,2	112,4
avr-22	0,33	103,41
mai-22	0,77	110,1
juin-22	0,21	116,8
juil-22	1,68	105,08
août-22	2,33	95,97
sept-22	2,56	88,22
oct-22	3,08	90,33
nov-22	3,78	87,38
déc-22	4,1	78,07
janv-23	4,33	80,41
févr-23	4,57	80,25
mars-23	4,65	76,47
avr-23	4,83	82,46
mai-23	5,06	74,12
juin-23	5,08	73,26
juil-23	5,12	78,98

Your task is to: Use excel Software

1. Write the linear regression that provide the relationship between the variables under study
2. Estimate the values of β_0 and β_1.
3. Stat & test the hypothesis related to this study.
4. determine the value of the dependent variable that is unexplained by the independent variable.
5. Determine the R^2 and explain its meaning.
6. Test the overall significance of the model.