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

Exercise 1

1. What does a simple linear regression model describe?

A) The relationship between two or more independent variables
B) The relationship between one independent variable and one dependent variable
C) The relationship between categorical variables
D) The relationship between dependent variables only

2. In the equation $Y = \beta_0 + \beta_1 X + \varepsilon$ what does β_1 represent?

A) The y-intercept
B) The error term
C) The slope of the regression line
D) The independent variable

3. What is the purpose of the error term (ϵ) in a regression model?

A) To capture the exact predictions
B) To represent the difference between observed and predicted values
C) To eliminate outliers
D) To represent the slope of the regression line

4. In simple linear regression, which of the following assumptions must be satisfied?

A) Non-linearity of data
B) Homoscedasticity (constant variance of errors)
C) Correlation between errors
D) Independent variables should be categorical

5. What is the formula for the coefficient of determination (R-squared)?

A) R^2=SSR/SST
B) R^2=SST/SSR
C) R^2=SSE/SST
D) R^2=SST/SSE

6. What does the coefficient of determination (R-squared) tell us in a simple linear regression?

A) The direction of the relationship
B) The goodness of fit of the model
C) The amount of bias in the model
D) The intercept value

7. If the slope β_1 is negative, what does that imply about the relationship between the independent and dependent variables?

A) There is no relationship between the variables
B) As the independent variable increases, the dependent variable increases
C) As the independent variable increases, the dependent variable decreases
D) The variables are not correlated

8.What does the term 'residual' mean in simple linear regression?

A) The difference between the predicted value and the actual value
B) The slope of the regression line
C) The predicted value of the dependent variable
D) The total sum of squares

9. What method is used to estimate the parameters of a simple linear regression model?

A) Maximum likelihood estimation
B) Method of moments
C) Ordinary least squares (OLS)
D) Bayesian estimation

Exercise 2

Suppose you are given a dataset that contains information about the number of hours student studied and their corresponding exam scores. You want to build a simple linear regression model to establish the relationship between exam scores and the number of hours studied. The dataset is as follows:

Hour studied (X)	Exam Score (Y)
2	60
3	62
4	66
5	71
6	78
8	80
10	86
12	93

Your task is to:

1. Calculate the mean of hours studied ($\bar{x}$) and the mean of exam scores ($\bar{y}$).
- Calculate the slope (β_1) of the regression line, and intercept (β_0) of the regression line.
2. Write the equation of the regression line in the form: $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$.
3. If the student studies for 15 hours, or 0 hour, what will be his score on the exam?
4. Calculate the error or the deviation of estimated (predicted) value from the actual value?
5. Calculate the value of the dependent variable that is unexplained by the independent variable?
6. Use excel Software to do the tasks 1-6