

**Question 1:**

1. Suppose you have a time series data of daily stock prices. The probability that a stock price increases on any given day is 0.6. What is the probability that the stock price will increase exactly 3 times in a week (7 days)?

**Question 2:**

2. In a given time series data, the probability that it rains on any given day is 0.3. If it rains, the probability that the stock market will go down is 0.7. What is the probability that the stock market is down and it is raining on some day?

**Question 3:**

3. The returns of a certain stock are normally distributed with a mean of 0.05 and a standard deviation of 0.02. Calculate the probability that the return on a given day is between 0.03 and 0.07.

**Question 4:**

4. You have a time series of daily sales data for a product. The number of units sold each day follows a Poisson distribution with a mean of 10. What is the expected number of units sold over a 5-day period?

**Question 5:**

5. Given a time series where the daily returns of a stock are independent and identically distributed with mean 0.01 and variance 0.0004, calculate the variance of the sum of returns over a 10-day period.

**Question 6:**

6. Consider a time series model where the autocorrelation at lag 1 is 0.8 and the autocorrelation at lag 2 is 0.6. If the variance of the time series is 1, calculate the autocovariance at lag 2.

**Question 7:**

7. Calculate the 3-day moving average for the following time series data: [4, 8, 6, 5, 9, 7, 10].

**Question 8:**

8. Given a time series data modelled by an ARIMA(1,1,1) process, where the autoregressive coefficient is 0.7 and the moving average coefficient is -0.4, write down the model equation and interpret the parameters.

**Question 9:**

9. A time series analyst claims that the mean daily return of a stock is 0.002. A sample of 30 days of returns shows a sample mean of 0.0015 with a standard deviation of 0.0005. Perform a hypothesis test at the 5% significance level to test the analyst's claim.

**Question 10:**

10. Construct a 95% confidence interval for the mean of the daily returns given a sample mean of 0.0015, a sample standard deviation of 0.0005, and a sample size of 30 days.

**Question 11:**

- 11.. Provide an example of a non-stationary time series and a method to transform it into a stationary one.

**Question 12:**

12. Given a time series with an upward linear trend and annual seasonality, describe how you would decompose this time series using the additive model.

- 13 .You have built two time series models to forecast sales data: Model A with a Mean Absolute Error (MAE) of 5 and Model B with a Root Mean Squared Error (RMSE) of 6. Which model performs better and why? Provide a detailed explanation.