Scenario set question 1 Time series

Scenario 1: Identifying Trend
You are given a dataset showing daily temperature for the past year. You notice the values generally increase over time. How do you confirm the presence of a trend?

1. **Plot the time series to visually check if values rise over time.**
2. **Apply a moving average to smooth fluctuations.**
3. **Perform time series decomposition to view the trend component.**
4. **Compare rolling means across different periods.**
5. **Use a trend test (e.g., Mann-Kendall) to statistically confirm it.**

Scenario 2: Detecting Seasonality
You are analyzing monthly electricity usage and notice similar spikes every summer. How do you confirm seasonality?

1. **Plot the time series to see repeating patterns at regular intervals.**
2. **Check seasonal decomposition to view the seasonality component.**
3. **Compare month-wise averages (e.g., each July vs other months).**
4. **Use autocorrelation plots (ACF) to see repeating peaks.**
5. **Examine rolling seasonal patterns across multiple years.**

Scenario 3: Making Data Stationary
Your time series model gives poor results. The data shows trend and seasonality. How do you prepare it for ARIMA?

1. **Remove the trend using differencing (e.g., first difference).**
2. **Remove seasonality using seasonal differencing.**
3. **Apply transformations (log, sqrt) to stabilize variance if needed.**
4. **Re-check stationarity using ADF test after each step.**
5. **Use the transformed, stationary series as input for ARIMA.**

Scenario 4: Choosing Model for No Seasonality
Your time series data (e.g., daily website visits) has no visible seasonality but has a clear trend. Which model would you choose?

1. **Use ARIMA since the data has trend but no seasonality.**
2. **Apply differencing to remove the trend before modeling.**
3. **Select AR and MA terms using ACF/PACF plots.**
4. **Train the ARIMA model on the stationary series.**
5. **Validate the model using residual diagnostics and forecasts.**

Scenario 5: Evaluating Forecast Performance
You forecast sales for 3 months and want to check how accurate it is. What steps do you follow?

1. **Compare forecasted values with actual sales for the 3 months.**
2. **Calculate error metrics such as MAE, MSE, or RMSE.**
3. **Compute MAPE to understand percentage error.**
4. **Plot actual vs. predicted values to visually assess accuracy.**
5. **Check residuals to ensure no major patterns or bias remain.**

Scenario 6: Sudden Spike in Data

1. You're analyzing daily water consumption. One day, the value suddenly jumps very high. What will you do?
    1. **Check if the spike is a real event or a data entry error.**
    2. **Compare the value with neighboring days to confirm abnormality.**
    3. **Use statistical methods (like z-score or IQR) to detect outliers.**
    4. **Decide whether to keep, correct, or remove the spike based on context.**
    5. **If kept, apply smoothing or robust models to reduce its impact.**

Scenario 7: Sales Goes Up Every December

You're analyzing a store's monthly sales. Sales always increase in December. What does this indicate?

1. **A repeating rise every December indicates seasonality in the data.**
2. **Specifically, it shows annual seasonal patterns tied to holidays/festivals.**
3. **This seasonal effect should be included in forecasting models like SARIMA.**
4. **Compare December sales across years to confirm consistency.**
5. **Plan seasonal adjustments or promotions based on this predictable pattern.**

Scenario 8: Forecasting with Missing Values

You are forecasting stock prices, but a few days of data are missing. What should you do?

1. **Identify which dates have missing stock prices.**
2. **Decide if missing points are small enough to fill or too large to recover.**
3. **Use interpolation (linear/time-based) to fill small gaps.**
4. **For larger gaps, consider forward/backward fill or removing those days.**
5. **Re-check the cleaned dataset before training the forecasting model.**