

Scenario 1: Retail Store Sales Analysis

Situation:

You are a data analyst at a retail store chain that operates from Tuesday to Saturday. You need to monitor sales trends for the first 10 business days of 2024, starting from January 1. To better understand weekly performance, you want to arrange the sales data to a weekly frequency and calculate the moving average with a 3-period window.

Task:

Create a time series starting from January 1, 2024, for 10 periods using custom business days (Tuesday to Saturday). Then, arrange the data to a weekly frequency and calculate the moving average with a window of 3 periods to analyze sales trends.

Scenario 2: Monthly Budget Tracking

Situation:

As a financial analyst, you're tasked with tracking budget expenditures over the first quarter of 2024. You have specific dates and amounts recorded. To report monthly totals, you need to convert the dates to a datetime format, set them as the index, and arrange the data to a monthly frequency to sum the expenditures.

Task: Given the following data, convert the date column to a datetime object and set it as the index. Then, arrange the data to a monthly frequency and compute the sum of the values to track monthly expenditures.

```
data = {
    'date': ['2024-01-01', '2024-01-15', '2024-02-01', '2024-02-15',
    '2024-03-01'],
    'value': [100, 200, 300, 400, 500]
}
```

Scenario 3: Quarterly Performance Review

Situation:

As part of a company's quarterly performance review, you're asked to analyze daily production data for the year 2024. The goal is to identify the production variability within each quarter. You need to arrange the data to a quarterly frequency and apply a custom function to calculate the difference between the maximum and minimum production values for each quarter.

Task:

Create a time series for the year 2024 with a daily frequency. Then, arrange the data to a quarterly frequency. Finally, apply a custom function that subtracts the minimum value from the maximum value for each quarter to measure production variability.

Scenario 4: Product Demand Forecasting

Situation:

You work in the supply chain department of a company and need to forecast product demand. Starting from March 1, 2024, you have daily sales data for 30 days. To smooth out fluctuations and better predict future demand, you need to calculate the 7-day moving average and standard deviation of sales.

Task:

Generate a time series starting from March 1, 2024, with a daily frequency for 30 periods. Calculate the 7-day moving average and standard deviation to forecast product demand.