

# TSA Practical 2

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## Practical Questions

**The “Nottem” dataset is available in the R library and contains historical time series observations.**

**Using this dataset, perform the following tasks:** (a) Write the R command to load the library in which the “Nottem” dataset is available. (b) Write the R command to load the “Nottem” dataset into the R working environment. (c) Write the appropriate R command to view the description of the dataset and briefly explain the key characteristics of the data. (d) Explain the nature of the data in terms of its sampling frequency. (e) Plot the time series data and write your observations about the pattern of the data.

## R Code Solution

```
# Practical-2
rm(list=ls()) # Remove all previous variables

# (a) Write the R command to load the library in which the “Nottem” dataset
# is available.
# The 'nottem' dataset is part of the standard R 'datasets' package, which
# is loaded by default.
# However, explicit loading is good practice if it were in another package.
library(datasets)

# (b) Write the R command to load the “Nottem” dataset into the R working
# environment.
data(nottem)

# (c) Write the appropriate R command to view the description of the
# dataset and briefly explain the key characteristics of the data.
# To view the description in R, you would use: help(nottem) or ?nottem
# We will print the structure and summary statistics here to understand it.
print("Structure of the dataset:")
str(nottem)
print("Summary of the dataset:")
summary(nottem)

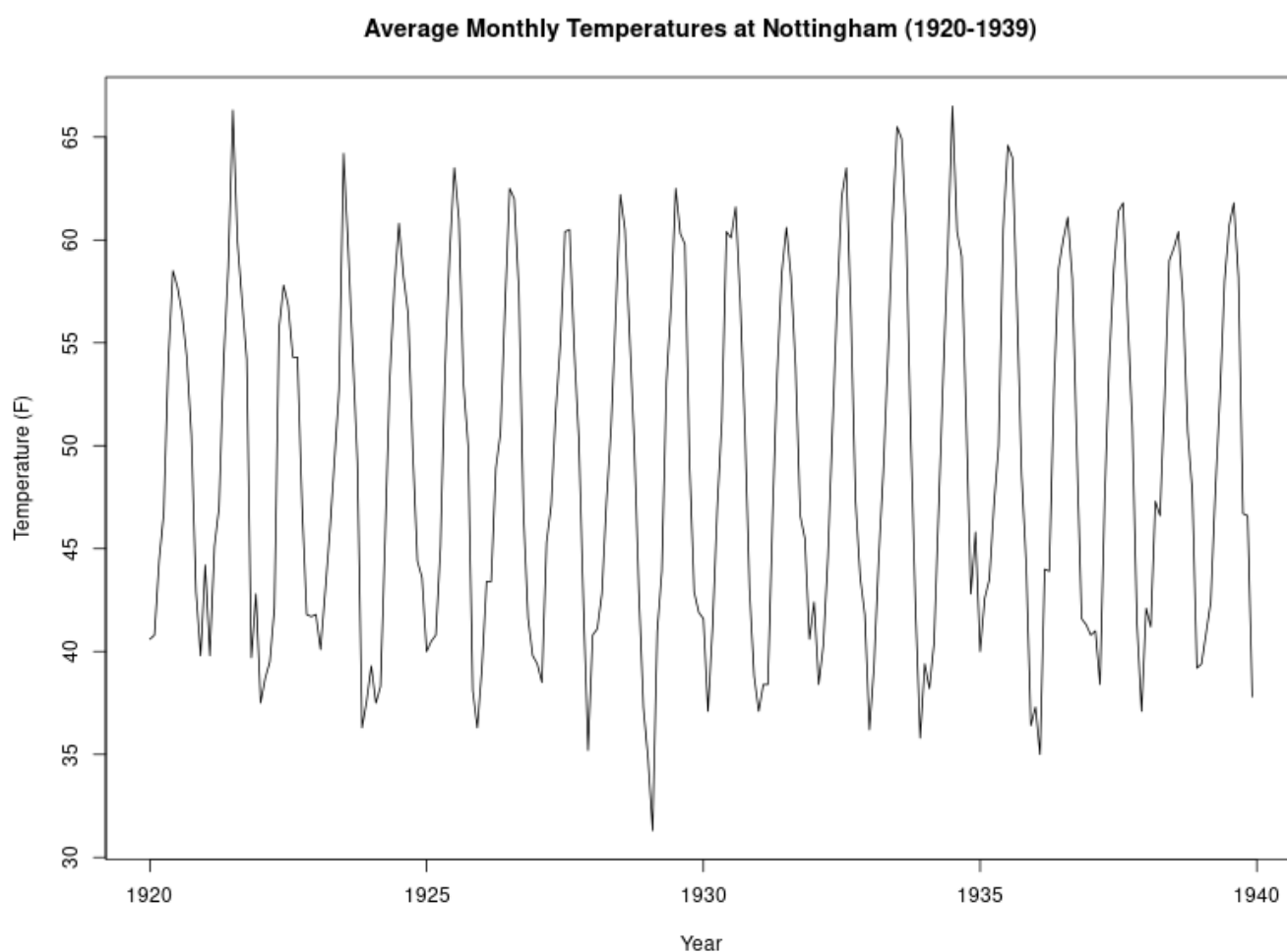
# Key characteristics (from help and structure):
# - It is a time series object of average monthly temperatures at
# Nottingham Castle.
# - The data covers the period 1920 to 1939.
# - Unit: Degrees Fahrenheit.

# (d) Explain the nature of the data in terms of its sampling frequency.
freq <- frequency(nottem)
print(paste("Frequency:", freq))
# Explanation:
# The frequency is 12, which indicates Monthly data (12 observations per
# year).
# Start(nottem) returns c(1920, 1) and End(nottem) returns c(1939, 12).
```

```
# (e) Plot the time series data and write your observations about the
pattern of the data.
png("nottem_plot.png", width=800, height=600)
plot(nottem,
      ylab = "Temperature (F)",
      xlab = "Year",
      main = "Average Monthly Temperatures at Nottingham (1920-1939)")
dev.off()

# Observations:
# The dominating component is Seasonality.
# There is a clear repeating pattern every year (12 months), corresponding
to seasonal temperature changes (summer highs, winter lows).
# There is no obvious long-term Trend (the mean seems constant over the
years).
print("Observation: The plot shows strong Seasonality with no obvious
Trend.")
```

## Output Plot



## Analysis Summary

- **Structure:** Time series object, 240 observations (1920-1939), Monthly frequency.

- **Pattern:** The plot exhibits a very strong, consistent **Seasonal** pattern.
- **Seasonality:** The temperature rises and peaks in the middle of each year (Summer) and drops to a trough at the beginning/end of each year (Winter). This cycle repeats annually.
- **Trend:** There is **no apparent long-term trend** (stationary in the mean); the average temperatures appear roughly constant across the 20-year period.