Welcome to the course!

TIME SERIES ANALYSIS IN R

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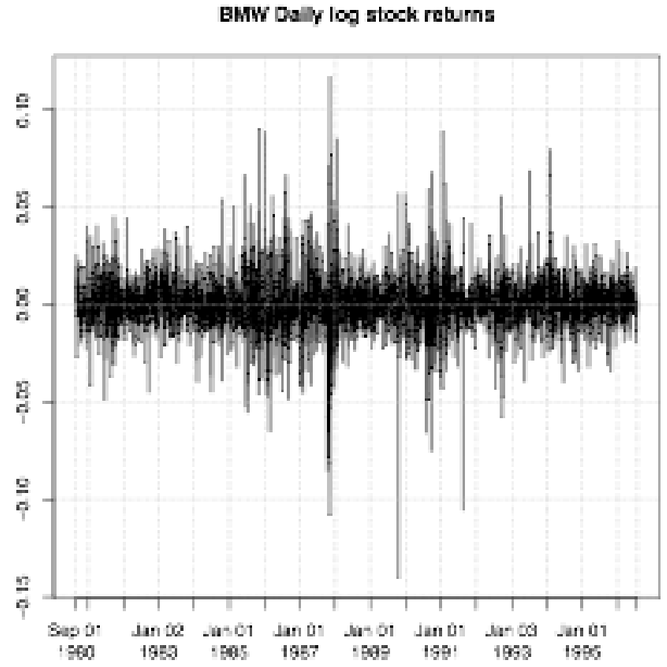
datacamp

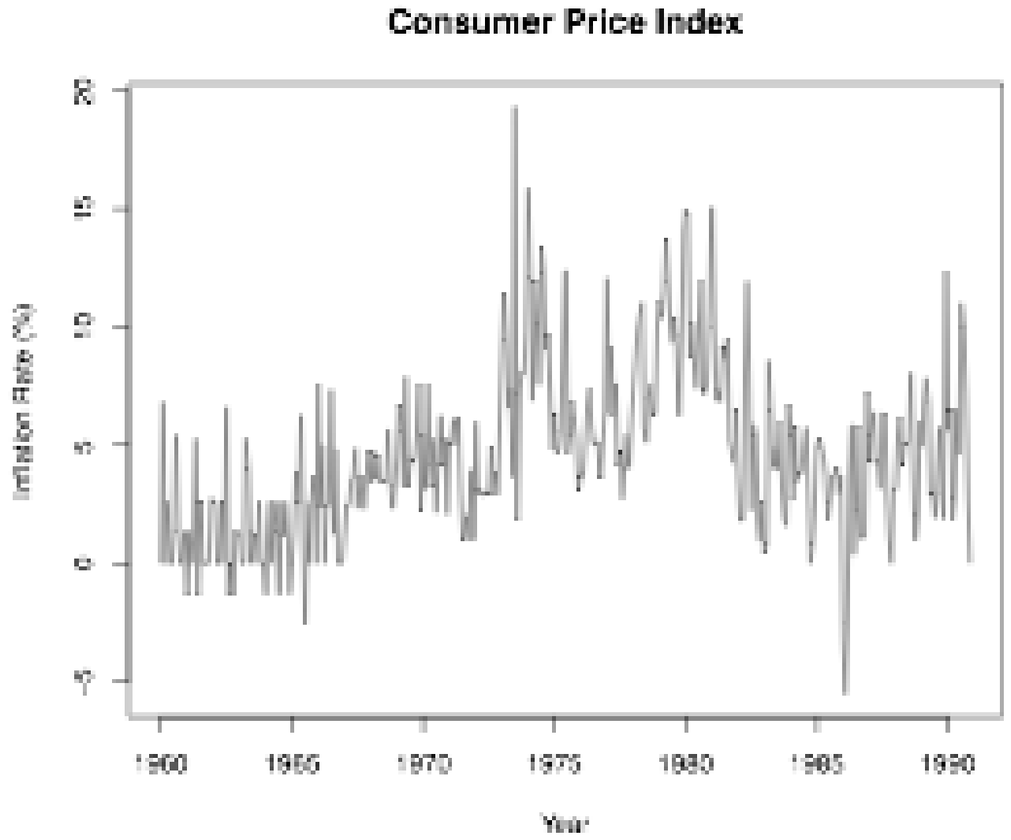
Introduction

- Time Series: A sequence of data in chronological order.
- Data is commonly recorded sequentially, over time.
- Time series data is everywhere.



Time series example

Monthly values of the Consumer Price Index (CPI):



Time series data

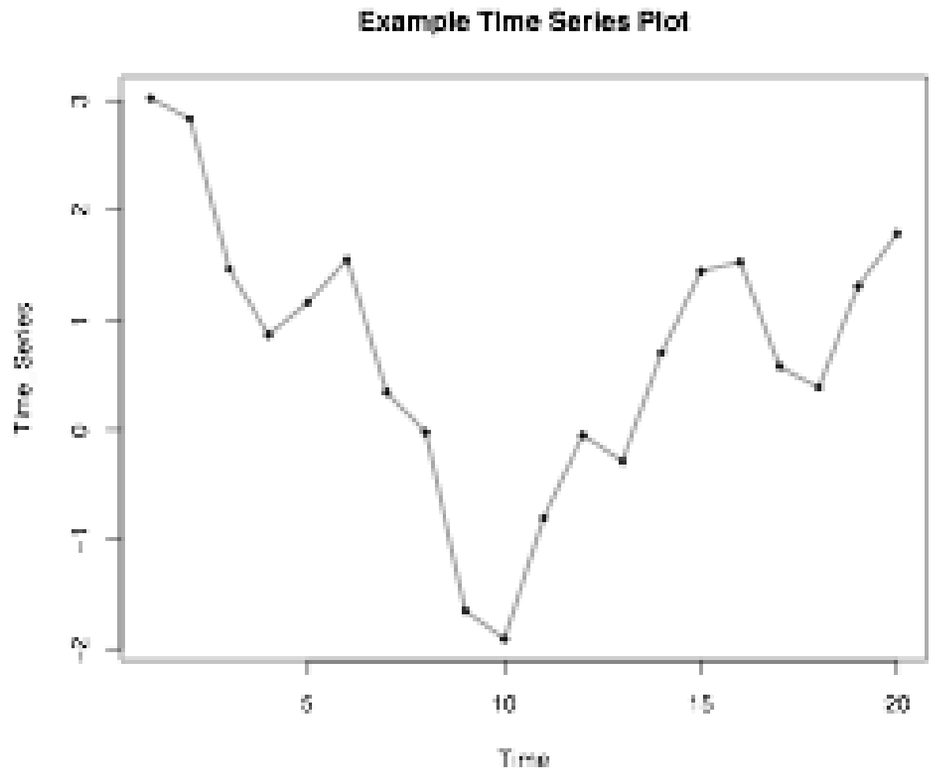
- Time series data is dated or time stamped in R.

```
print(BMW_data)
```

```
...
1996-07-08   0.002
1996-07-09  -0.006
1996-07-10  -0.016
1996-07-11  -0.020
1996-07-14  -0.006
1996-07-15  -0.014
1996-07-16   0.002
1996-07-17  -0.001
...
```

Time series plots

```
plot(Time_Series)
```



Basic time series models

- White Noise (WN)
- Random Walk (RW)
- Autoregression (AR)
- Simple Moving Average (MA)

[1] Throughout this course, you will not only be learning how to use R for time series analysis and forecasting, you will also learn several models for time

Time series plots

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Sampling frequency

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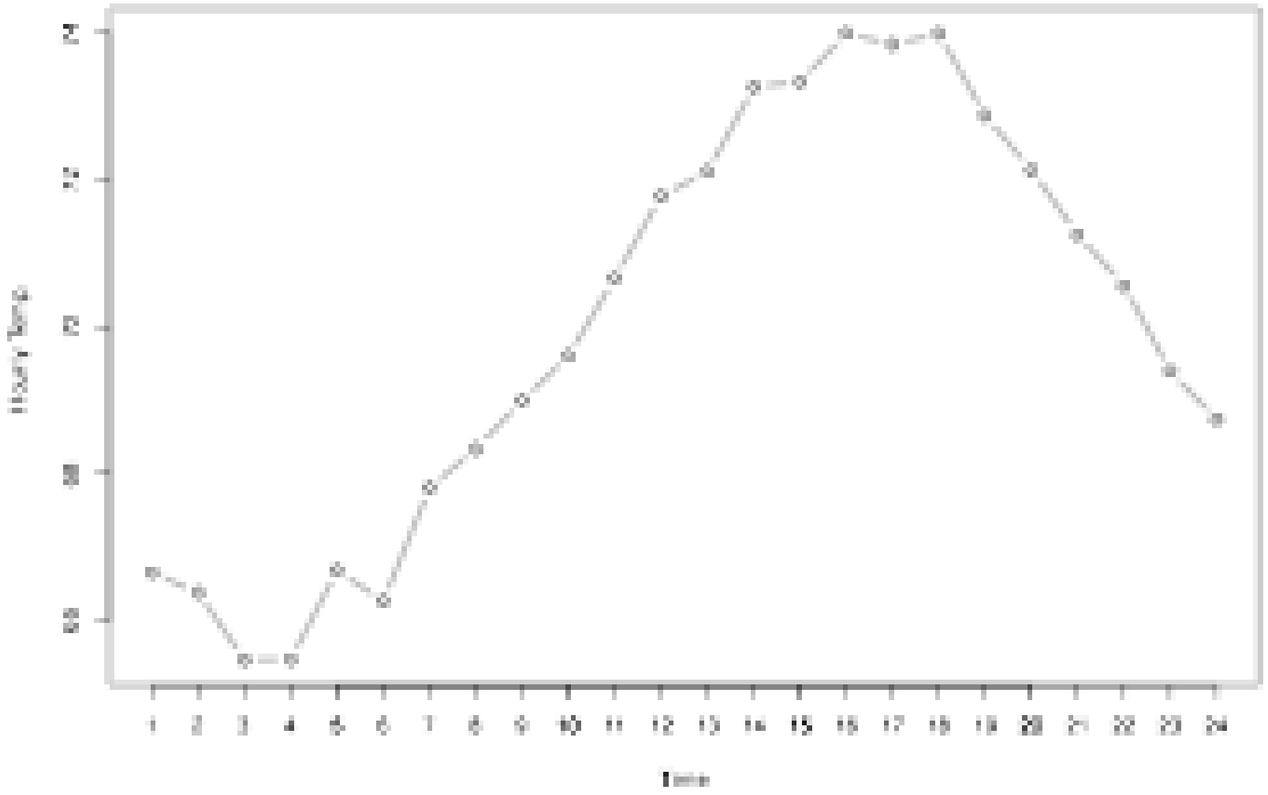
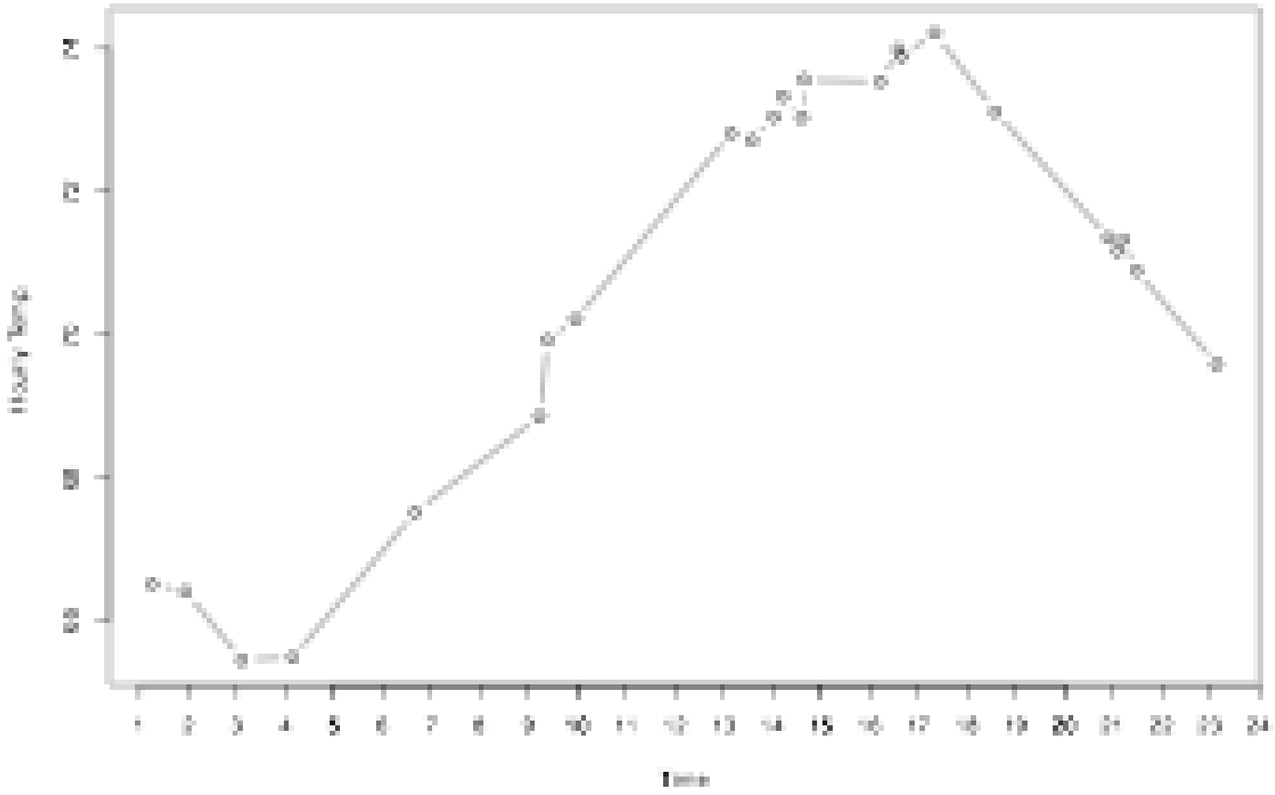
Sampling frequency: exact

- Some time series data is exactly evenly spaced.



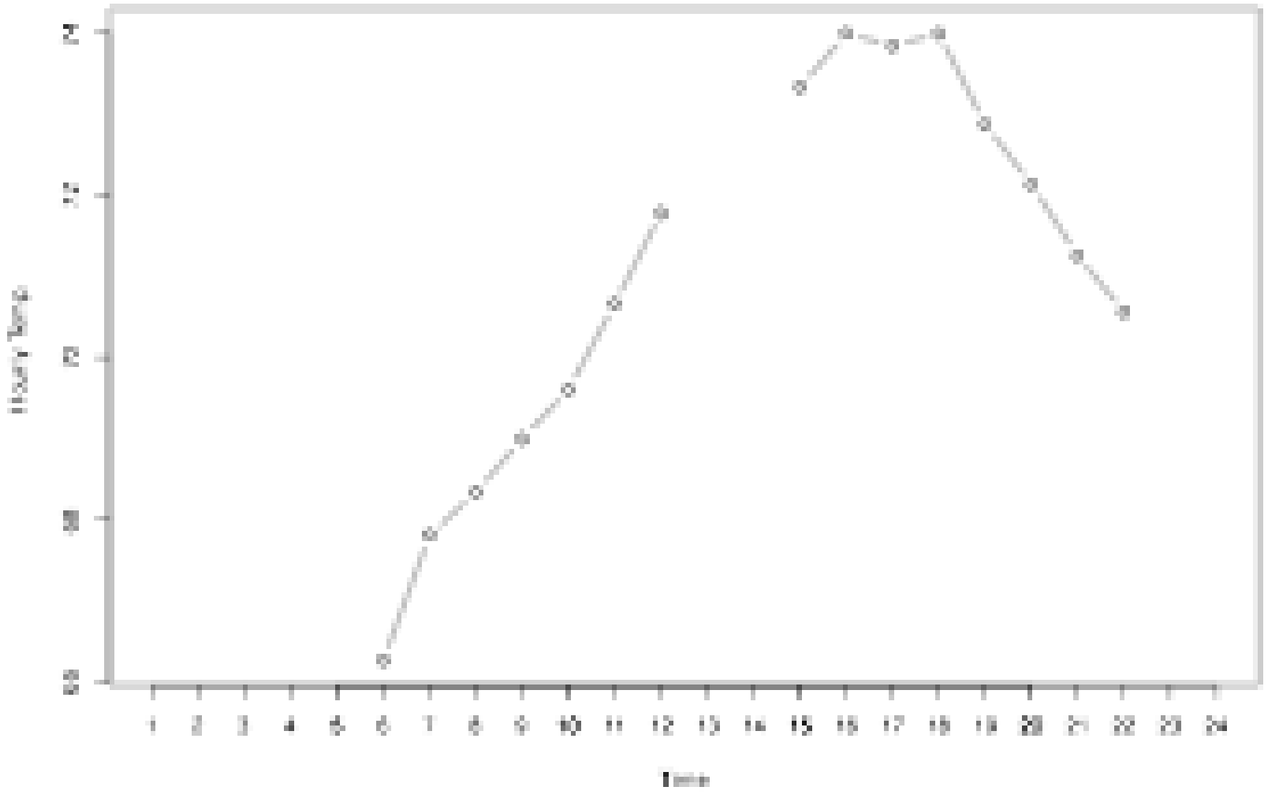
Sampling frequency: approximate

- Some time series data is only approximately evenly spaced.



Sampling frequency: missing values

- Some time series data is evenly spaced, but with missing values.



Basic assumptions

Simplifying assumptions for time series:

- Consecutive observations are equally spaced.
- Apply a discrete-time observation index.
- This may only hold approximately.

Ex. Daily log returns on stock may only be available for weekdays.

Ex. Monthly CPI values are equally spaced by month, not by days.

Sampling frequency: R functions

- R functions: `start()`, `end()`, `frequency()`, `deltat()`

```
start(Hourly_series)
```

```
1 1
```

```
end(Hourly_series)
```

```
1 24
```

```
frequency(Hourly_series)
```

```
24
```

```
deltat(Hourly_series)
```

```
0.0417
```

Let's practice!

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Basic time series objects

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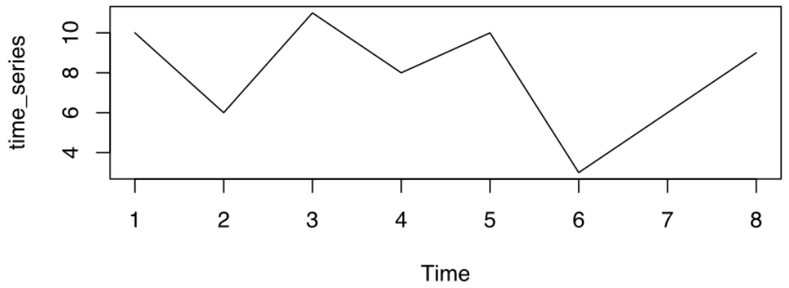
Building ts() objects - I

- Start with a vector of data
- Apply the `ts()` function

```
data_vector
```

```
10 6 11 8 10 3 6 9
```

```
time_series <- ts(data_vector)
plot(time_series)
```

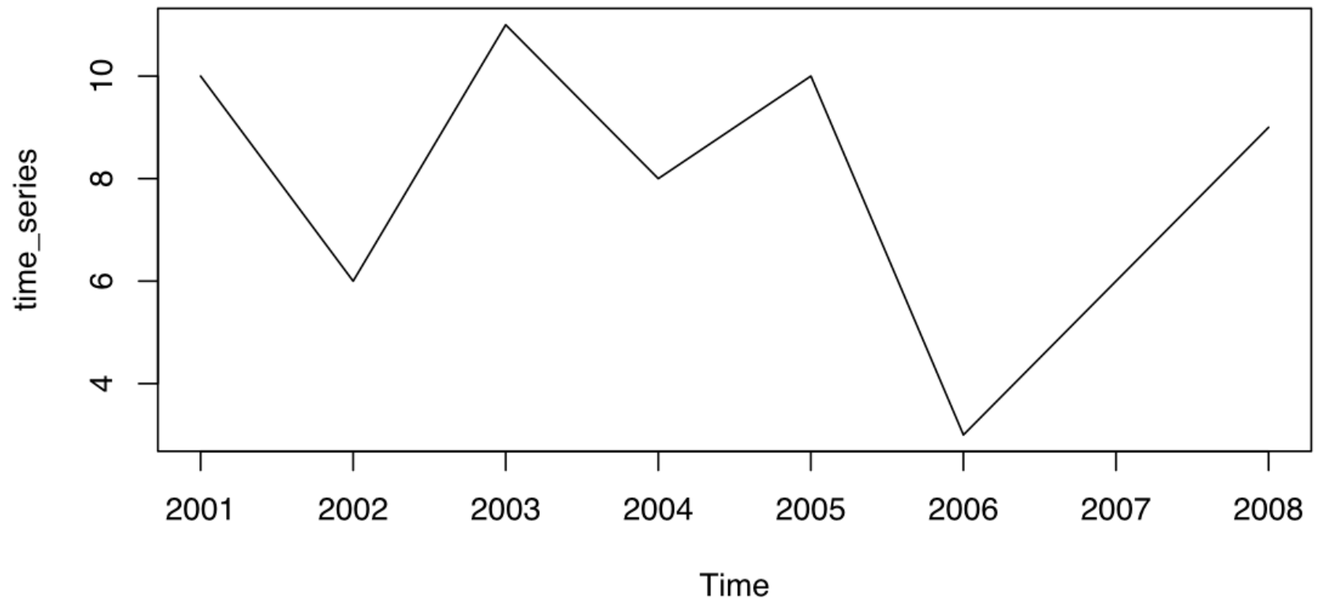


Building ts() objects - II

- Specify the start date and observation frequency:

```
time_series <- ts(data_vector, start = 2001, frequency = 1)
```

```
plot(time_series)
```



Using is.ts()

- The `is.ts()` function checks whether an object is of the `ts()` class:

```
is.ts(data_vector)
```

```
FALSE
```

```
is.ts(time_series)
```

```
TRUE
```

Why ts() objects?

Why create and use time series objects of the ts() class?

- Improved plotting.
- Access to time index information.
- Model estimation and forecasting (later chapters).

Let's practice!

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