

Time Series Homework: Chapter 1 Lesson 1

Please_put_your_name_here

Learning Outcomes

Introduce the course structure and syllabus

- Get to know each other
- Describe key concepts in time series analysis
- Explore an example time series interactively

Exercises

Exercise 1 (5 points)

What is something unusual or unique about you?

Answer

Exercise 2 (5 points)

What do you hope to gain from this class?

Answer

💡 Tip for Exercise 3

In a qmd file, you can do all sorts of fun things. If you type `<ctrl> <alt> i`, RStudio will insert an R code chunk, where you can run any R code. The code below generates 10 uniform random variables between 0 and 1.

```
# Load required R packages
if (!require("pacman")) install.packages("pacman")
pacman::p_load(tidyverse, lubridate)

# Set the random number seed
set.seed(100)

# Define the number of values to simulate
reps <- 4

# Create a data frame with a counter variable, t,
# and the simulated values, called x
df1 <- data.frame(t = 1:reps, x = runif(reps, min = 0, max = 1))
df1
```

```
  t      x
1 1 0.30776611
2 2 0.25767250
3 3 0.55232243
4 4 0.05638315
```

You can use inline R code as well. For example, the mean of the $n=4$ simulated x values is: 0.293536.

If you do not know how to use any command such as `rnorm` in R, you can type the name of the command after a question mark (e.g. `?rnorm`) in the console area, and the help file will appear on the right.

Exercise 3 (10 points)

Use the `rnorm` command to simulate 100,000 normally-distributed random variables with a mean of 50 and a standard deviation of 10. Please do not list all the numbers. Instead, give a histogram of the data.*

Answer

Exercise 4 (10 points)

Suppose your pulse was measured at the start of every hour today and the values are given in the data frame `pulse_df`.

```
set.seed(123)
pulse_df <- data.frame(
  times = paste0(as.Date(substr(now(),1,10)), " ", c(0:23), ":00"),
  value = sample(70:100, size = 24, replace = TRUE)
)
```

We can convert a character representation of a date to a date-time object. The Lubridate package contains commands such as `mdy("12/31/2024")` which converts this value to: 2024-12-31. There are other variations of this command such as `dmy_hms("31/12/2024 15:16:47")` which gives us: 2024-12-31 15:16:47.

Use the command `ymd_hm()` to filter the four observations from noon to 3 PM (15:00). Then, compute the mean of the observed value for these four times. Write your code in the R chunk below. Write an English sentence giving this mean and its interpretation in terms of your pulse rate.

Answer

```
# put your code here
pulse_df |>
  head() # lists the first 6 values - delete this sample command
```

	times	value
1	2024-01-08 0:00	100
2	2024-01-08 1:00	84
3	2024-01-08 2:00	88
4	2024-01-08 3:00	83
5	2024-01-08 4:00	72
6	2024-01-08 5:00	79

Exercise 5 (5 points)

Do you have any concerns about your ability to succeed in this class? If so, please share them.

Answer