

Midterm 1 — Sample 1

DATA 412/612

Practice exam, questions only. Cumulative through October 14 (weeks 1–7): the Quiz 1 material, plus `rowwise()` and `across()`, `case_when()`, `readr`, exploratory plots, and `pivot_longer()`.

Put your answers in an R Markdown document and keep the code visible (`knitr::opts_chunk$set(echo = TRUE)` in the setup chunk). You may use your notes, the R help files, and the internet. Do not discuss the exam with anyone else. Load the tidyverse. `mpg` comes with `ggplot2`.

1. **`case_when()`** (8 pts). In `mpg`, add **efficiency**: "high" when `hwy` is at least 30, "mid" when `hwy` is at least 20, and "low" otherwise. Then, for each **class** and **efficiency**, report the number of cars. Arrange so the largest counts come first.
2. **Row-wise and `across()`** (8 pts). Use this tibble.

```
quizzes <- tibble(
  student = c("Ada", "Lin", "Grace"),
  q1 = c(8, NA, 9),
  q2 = c(7, 10, NA),
  q3 = c(9, 8, 8)
)
```

- a. With `across()`, count the NAs in each quiz column.
 - b. With `rowwise()` and `c_across()`, add each student's mean of `q1`, `q2`, and `q3`, ignoring missing quizzes.
3. **`readr` and a plot** (12 pts).

- a. Parse this frame. **when** should be a date, **price** a number (the dollar sign and the word `n/a` are not numbers), and **ok** logical, with the string `NA` meaning missing.

```
raw <- tibble(
  when = c("2024-03-01", "2024-03-18", "2024-04-02", "2024-04-09"),
  price = c("$12.50", "8", "n/a", "$15"),
  ok = c("TRUE", "FALSE", "NA", "TRUE")
)
```

- b. Using `mpg`, make one plot that compares highway mileage across **class**. State which class has the highest median `hwy`, and give that median.
4. **`pivot_longer()`** (12 pts). Reshape **wide** so there is one row per country and year, a numeric **year** column, and a **cases** column. Strip the `y` from the year names. Drop rows whose case count is missing. Then report the country and year with the most cases.

```
wide <- tibble(
  country = c("A", "B"),
  y2021 = c(10, NA),
  y2022 = c(12, 7),
  y2023 = c(9, 15)
)
```