

STATISTICAL RETHINKING WINTER 2025

HOMEWORK, WEEK 1

What is homework? Your completed answers to the prompts below should contain all the code necessary to repeat your calculations.

When is homework due? Homework is due each FRIDAY before the relevant discussion of the solutions. So for this first homework assignment, it'll be due on 17 January 2025. You are welcome to work in groups. Just please turn in your individual answers. If ever you are late with homework, it's okay. Life is complicated. Turn it in when you finish it. The learning comes from doing it. I want you to do it. But keeping to deadlines is also good for your pace of learning, which is why I suggest keeping up.

Where is homework due? Upload your homework at the link provided to enrolled students. Please name the file with your name and the course week. The preferred file format is PDF or a plain text file (.Rmd or .R or .py or .jl). Please do not turn in a Microsoft Word document.

WEEK 1 PROBLEMS. For your own good, it would be helpful to review the EASY problems at the end of Chapters 1, 2 and 3 (2nd edition). The answers are in the solutions guide.

1. To study honesty, behavioral scientists have used an experiment called the *Random Allocation Game* (RAG). In a RAG, participants are given a single six-sided die. Participants roll the die, and if the resulting number is 4 or 5 or 6, they win a small cash prize (like 10 Euros). Participants roll the die in private—the experimenter cannot see or verify the result, and participants know this.

While it is impossible to know if any individual participant honestly obeys the result of the die roll, in the aggregate the proportion of prize claims provides information about the frequency of honesty in the sample. For example, if everyone claims the prize, then probably a lot of them are liars.

Suppose 171 participants play a RAG and 111 of them claim the prize. Compute the posterior distribution for the proportion of participants who are honest. By honest, I mean an individual honestly obeyed the result of the die roll.

2. Using the posterior distribution from 1, compute the posterior predictive distribution for the next 10 participants. How many of them will claim the prize? Your answer should be a distribution.