MLW / KUHeS Statistics and R short course

Session 3 - Practical

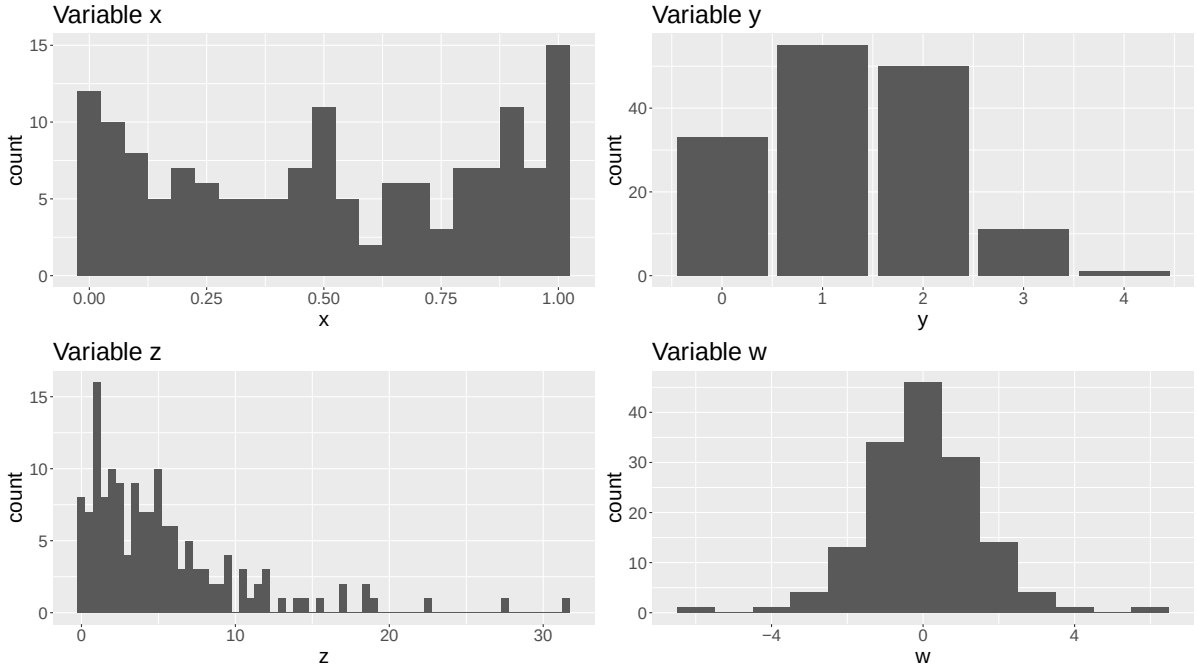
Marc Henrion, Evaristar Kudowa

2026-01-26

Session 3 - Practical

Exercise 1 - Distributions

Which distributions do you think gave rise to each of the variables displayed below?



Exercise 2 - Distributions

1. Generate 20 random values from a Gamma(4,6) distribution.

2. You are recruiting participants to a cohort study of 200 patients. The chance that a given participant drops out of the study before completing the last follow-up visit is 10%. How likely is it that you will end up with complete data for fewer than 180 participants?
3. You have found that the Poisson distribution, with rate $\lambda = 1.12$, is a good fit for the number of cardiac events recorded over a month by a given patient in your ward. What is the probability that a given participant experiences 0 cardiac events?
4. For a normal distribution with mean $\mu = 5$ and standard deviation $\sigma = 1$, what is the probability of observing a value of 8 or larger?

Exercise 3 - Central Limit Theorem

In the lecture we saw how to empirically prove the CLT for the normal, beta and binomial distributions. Do the same now for the exponential and the Poisson distributions.

Exercise 4 - Study design

Decide what design could be used to answer the following research questions:

1. What is the prevalence of HIV in urban Blantyre in 2018?
2. Do men experience higher mortality compared to women once they start ART?
3. Does smoking increase the chance of having lung cancer?
4. What is the effect of providing oral HIV self-test kits on the uptake of HIV testing?
5. What interventions may improve linkage to ART following community based HIV testing?