
Problem for Day 2. *In this exercise we will sample from a standard normal distribution using the acceptance/rejection sampling method, based on the Cauchy proposal distribution. Consider the target density function (standard normal density function)*

$$f(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right),$$

and the proposal density function (Cauchy density function)

$$g(x) = \frac{1}{\pi(x^2 + 1)}.$$

open the code `exercise_4.py` in day 2 folder and follow the following instructions.

- 1. write a Python functions $f(\mathbf{x})$ and $g(\mathbf{x})$ that computes the density functions of target Gaussian density f and proposal Cauchy density g .*
- 2. set the step size $c = 2$ for acceptance/rejection algorithm and draw 2000 samples from the distribution of.*
- 3. Plot the histogram of the samples and show that they approximate a standard-normal distribution.*
- 4. Choose the step-size $c = \{1.152, 2\}$, and repeat the sampling. Compute the number of accepted samples. Which value is the best and why?*