Goals
The goal of the tutorial is to apply the prior distribution for coin tosses in small exercises and so better understand the beta distribution used to model coin tosses.

Problem setting
The proper prior distribution $p(\theta)$ for modeling coin tosses is the beta distribution (Slide 21). The beta distribution can encode different knowledge. In MATLAB the function `betapdf(x, alpha_k, alpha_z)` is used to calculate the density of the beta distribution.

Task 1
Analyze the following MATLAB-Script `t9_task1.m`. This script visualizes the probability for different parameters $\theta$ of the beta distribution for a fair coin ($alpha_k = 5$, $alpha_z = 5$).

Task 2
Write the following MATLAB-Script

`t9_task2`

which visualizes the probabilities for different parameters $\theta$ for the beta distribution for a fair coin with a stronger prior. (see task 2).

Task 3
Write the following MATLAB-Script

`t9_task3`

which visualizes the probabilities for parameters $\theta$ for the beta distribution for a coin, where a parameter $\theta > 0.5$ is more likely than a parameter $\theta < 0.5$ (see task 2).
Task 4
Write the following MATLAB-Script
t9_task4

which visualizes the probabilities for parameters $\theta$ for a coin without prior knowledge (uniform prior).

Task 5
Write the following MATLAB-Script
t9_task5

which computes the posterior $p(\theta|data)$ with the formula from the lecture (slide 26). Suppose you have seen heads 7 times and tails 1 only once.

Task 6
Write the following MATLAB-Script
t9_task6

which computes the posterior $p(\theta|data)$ with the formula from the lecture (slide 26). Suppose you have seen heads 7000 times and tails 1000 times.