

## Exercise Sheet 4 for Algorithms of Bioinformatics (Winter 2025/26)

**Hand In:** Until 2025-11-14 18:00, on ILIAS.

### Problem 1

30 points

Consider the following biased coin: With probability  $p$ , it shows **H** (heads) and with probability  $q := 1 - p$ , it shows **T** (tails).

Let  $X$  be the random number of coin tosses until the pattern **THTTH** appears for the first time.

Compute the probability generating function  $G_X(z)$  for  $X$  and determine the expected value and the variance of  $X$  as a function of  $p$ .