

Exercises

EXERCISE 1

Generate random samples of size 400 from the normal, exponential, uniform and max-Fréchet distributions and make the following plots:

1. Plot the normal and uniform samples on normal probability papers and explain the results.
2. Plot all samples on maximal Gumbel probability papers and discuss the results.
3. Plot all samples on minimal Gumbel probability papers and discuss the results.

EXERCISE 2

Using Monte Carlo samples,

1. Determine the domain of attraction for maxima and minima for the following distributions: (a) beta, (b) gamma, (c) squared Chi and (d) log-normal.
2. Check that they correspond to the ones in the table of the domains of attraction of the most common distributions given in these notes.

EXERCISE 3

Simulate a sample of **200** values from a Maximal-Weibull distribution with parameters:

$$\lambda = 9; \quad \delta = 3; \quad \beta = 2.5.$$

1. Assuming that this sample corresponds with the maximum yearly wave heights in a given location for the last **200** years, obtain the design wave height for the return periods **1**, **20** and **50** years.
2. Determine the mean number of yearly maxima exceeding the third maxima occurred in the past **200** years and its variance.

Simulate a sample of **200** values from a gamma distribution with parameters:

$$\kappa = 5; \quad \lambda = 1.$$

Assuming that this sample corresponds with the yearly total amount of available water in a given location for the last **200** years, obtain the design volume of water for return periods **1**, **20** and **50** years.