
STATISTICAL MODELING OF EXTREME VALUES, 2008
EXERCISES 5

1. Assume that N is $Poi(\lambda)$ and let X_1, X_2, \dots, X_N be a sequence of i.i.d. random variables independent of N and with generalized Pareto distribution, i.e.

$$X_i \sim H(x; \gamma, \sigma) = 1 - \left(1 + \gamma \frac{x}{\sigma}\right)^{-\frac{1}{\gamma}},$$

where $\sigma > 0$, $x > 0$ for $\gamma \geq 0$ and $0 < x < \sigma/|\gamma|$ for $\gamma < 0$. Show that $M_N = \max(X_1, X_2, \dots, X_N)$ has a generalized extreme value distribution. Consider two cases with $\gamma = 0$ and $\gamma \neq 0$.