

Statistics 624: Statistical Computing
Homework # 13
Due Thursday, 8 Nov., 8am

In this assignment, please complete, organize, and turn in **electronically** to `stat624@stat.byu.edu`.

This assignment demonstrates root finding using Newton Raphson (in two dimensions) .

An interesting problem in statistics is attempting to model the extreme values (minimum or maximum, for example) for a group of observations. One model for the distribution of extremes is the Gumbel distribution. The Gumbel distribution is derived from the exponential distribution. So, if X follows an exponential distribution with unity mean ($E(X) = 1$), then

$$Y_i = \alpha - \gamma \log(X)$$

follows a Gumbel distribution with parameters α and γ . One attractive feature of the Gumbel distribution is that α is the mode of the distribution and γ is the scale parameter.

The dataset `kew.gardens.txt` (available on the Stat 624 website) contains monthly maxima rainfall for Kew Gardens in the United Kingdom. Using these data, complete the following:

- Find the Gumbel distribution using change-of-variables.
- Find the joint maximum likelihood estimators for α and β .
- Find the maximum likelihood estimator for the mean of a Gumbel distribution.
- Find the MLE to precision 10^{-14} , and include a `maxiter` check.