Working Problems for BSE 5034 Stochastic Hydrology (2017)

WP-5 Hydrological Frequency Analysis (HFA-II) LMRD-based GOF test

1. Annual maximum rainfalls (in mm) of 24-hr duration recorded at a raingauge station are listed in the following table. (V27 in AMS_24hr.csv.)

142	257	942	381	513	238	549	523	715	481
609	380	432	263	647	914	168	403	440	646
189	797	620	500	589	488	356	1089	138	258
256	463	727	274	407	776	1473	810	987	810
1237	290								

A goodness-of-fit test on the above annual maximum data suggests that the 3-parameter log-normal, log-Pearson type III, Pearson type III, and Gumbel are possible candidate distributions.

(1) Determine the best-fit distribution for the data by considering the Akaike information criterion (AIC) and the Bayesian information criterion (BIC).

(2) For each of the four candidate distributions, estimate its distribution parameters by the method of L-moments and calculate the rainfall depths of 5, 20, 50, 100, and 200-year return periods.

[Note] For model selection, install the *nsRFA* package and use the function *MSClaio2008(x)*. For parameter estimation by the method of L-moments and quantile estimation, use the following functions in *lmom* package: *pelpe3*, *pelgum*, *pelln3*, *quape3*, *quagum*, and *qualn3*.