

Index

- AD statistic, A_N^2 , 41
 algorithm, genetic, 201, 204
 application
 data, synthetic, 73–76
 flow, peak, 76
 precipitation, maximum daily, 76–79
 total flow deficit, 79
 Applications
 flow, peak, 105, 131, 153, 177, 200, 226, 266, 288, 296
 precipitation, maximum daily, 109, 131, 182, 203, 227, 267, 290, 296, 299
 rainfall amount, annual, 157
 synthetic, 101, 128, 151, 176, 198, 223
 total flow deficit, 105, 136, 184, 204, 230, 268, 293, 296, 303
 bell-shaped, 39
 BL
 Lomax, three-parameter, 188
 Lomax, two-parameter, 189
 bootstrap, parametric, 75, 99–100, 106, 176
 BSM, 50, 68, *See* Chapter 2
 exponential, 54
 generalized logistic, 53
 log-logistic-Hill-Fisk, 53, 58
 logistic, 54
 Lomax, 55
 Pareto, 55
 Weibull, 54
 CDF, 3–4, 10, 75, 130, 157
 empirical, 39
 parametric, 39
 CM statistic, W_N^2 , 41
 CMOM, 83, *See* moments, cumulative
 density, kernel, 37–38
 DFR, 3–4, 6, 55
 diagram, moment, 17, 72, 142, 173
 diagram, moment ratio, 98, 129, 150, 222
 distribution, instrumental, 102
 distributions
 beta. *See* Chapter 7
 Burr, 208
 Burr XII. *See* BSM
 chi-square, 44
 extreme value, modified, 5–6
 gamma, 3–4, 13, 20, 31, 39, 43, 46, 86, 90, 98, 101–102, 117, 129, 159
 gamma, two-parameter, 177
 Gumbel, 39, 46, 68, 89
 inverse Burr, 208
 inverse gamma, 86–87, 98, 141–142, 150–151
 inverse-gamma, 159
 log-logistic, 9
 logistic, 68
 lognormal, 9, 39, 46
 maximum entropy, 11, 16
 normal, 39, 87, 101, 117
 Pareto, 6, 8–9, 25, 208
 Pareto II, 204, *See* Lomax, two-parameter
 transformed beta, 208
 Wakeby, 68
 Weibull, 4, 39, 68
 distributions, generalized, 2
 Beta Lomax, 187, *See* Chapter 7, *See* BL
 beta Lomax, four-parameter, 208
 Burr–Singh–Maddala. *See* BSM
 exponential gamma, 2, 275, *See* FPEG
 extreme value. *See* GEV
 Feller–Pareto, 2

- Feller–Pareto, five-parameter, 208,
 See FP
 generalized beta Lomax, 2
 generalized gamma, 2
 Halphen type A, 2, 128, *See* Hal-A,
 Chapter 3
 Halphen type B, 2
 Halphen type IB, 2
 Kappa, 2, 68, 233
 Pareto, 208
 DPFR, 56
- EG. *See* FPEG
 entropy, 73, 78, 83, 138
 entropy, maximum, 90
 entropy, Shannon, 60, 90, 118, 141, 164, 212,
 240, 280, 284
 entropy method, parameter space expansion,
 10, 14, 63, 92, 121, 123, 167, 169, 191,
 216, 249, 282, 284
 entropy method, regular, 10–12, 14, 63, 92,
 121, 123, 144, 146, 167, 191, 214, 282
 equation, differential, 59
- failure rate
 decreasing. *See* DFR
 decreasing proportional. *See* DPFR
 increasing. *See* IFR
 increasingly proportional. *See* IPFR
- Family Burr, 50
 family, Pearson, 88
 FP, 297
 Burr, 210
 Burr, inverse, 211
 F, scaled, 210
 loglogistic, 210
 paralogistic, 210
 paralogistic, inverse, 211
 Pareto I, 209
 Pareto II, 209
 Pareto III, 209
 Pareto IV, 210
 Pareto, generalized, 210
 Pareto, inverse, 210
 transformed beta, 210
- FPEG. *See*
 chi-square, 275–276
 exponential, 275, 277
 gamma, 275–276
 half-normal, 275, 278
 Kritsky and Menkel, 275
 Kritsky and Menkel (GG3), 278
 normal, 275
 Pearson type III, 275–276, 288, 290
 Poisson, 275, 278
 Weibull, 275
 Weibull, three-parameter, 275, 277
 Weibull, two-parameter, 277
- FPEG, entropy-based, 281
- frequency
 expected, 44
 observed, 44
- function
 exponential factorial, 144
 gamma, 163
 Lagrangian, 143
 function, beta, 65, 208
 second kind, 69
 function, confluent hypergeometric,
 115
 function, convex, 12
 function, digamma, 168
 function, exponential factorial, 114, 127, 141,
 146, 149
 function, gamma, 115
 function, Lagrange, 119
 function, Lagrangian, 11, 61, 91, 165, 190,
 213, 216, 241, 280
 function, Likelihood, 30, 174, 220
 function, linear, 28
 function, log-likelihood, 66, 100, 128, 151,
 175, 196, 220, 257, 284
 function, modified Bessel
 second kind, 86–87
 function, parabolic cylinder, 115
 function, partition, 12, 61, 166
 function, penalty, 233
 function, survival, 52
 function, trigamma, 168
 functions, modified Bessel
 second kind, 92
- GBL. *See* BL
 generalized gamma, three-parameter, 162,
 See TPGG, *See* Chapter 6
 exponential, 164
 gamma, two-parameter, 164
 lognormal, two-parameter, 164
 Weibull, two-parameter, 164
- GEV, 39, 46, 85, 261, 268, *See* Chapter 9
 GG3, 296
 GoF, 104–105, 130, 225

- goodness-of-fit, 135, 153, 157, 204, 226, 230, 267, 306, *See* GoF
- goodness-of-fit, chi-square, 39, 44
- Hal-A, 85, 156, 159, 296, *See* chapter 3
- Hal-B, 114, 140, 151, 156, 159, 296, *See* chapter 4
- Hal-IB, 140, 296, *See* chapter 5
- hazard rate, 3, 55
- histogram, 37–38, 75
- IFR, 3–4, 9, 55
- information, fisher, 68, 175
- IPFR, 9, 56
- kappa, entropy-based, 267
- kappa, four-parameter, 266
- EV1, 235
- exponential, two-parameter, 236
- exponential, with location, 236
- GEV, 235
- kappa three-parameter, 235
- logistic, generalized, 237
- logistic, generalized two-parameter, 237
- Mielke, three-parameter, 237
- Pareto, generalized, 236
- uniform, 237
- KS statistic, 75, 108, 110, 135, 204, 267, 297, 300, 304, 306
- KS statistic, D_N , 39
- left-skewed, 39
- L-kurtosis, 28, 263
- LM, 233, 266
- L-moments, 10, 26–28, 69–70, 73, 76, 83, 162
- L-skewness, 28
- MAB, 297, 301, 306
- marix, Hessian, 100
- matrix
- observed Hessian, 197
- observed information, 196
- matrix, Hessian, 67, 285
- matrix, observed Fisher information, 285
- matrix, observed Hessian, 175
- matrix, observed information, 72, 100, *See* information fisher
- maximum entropy, the principle of. *See* POME
- maximum likelihood estimation, 10, *See* MLE
- mean absolute bias, 296, *See* MAB
- method, acceptance-rejection, 101, 130, 151, *See* method, A-R
- method, A-R, 105, 112, 130, 138, 153
- method, entropy, 102, 105, 111, 130–131, 136, 152–153, 176, 182, 199, 202–204, 206, 223, 229–231, 245, 266, 288, 290, 293
- method, Newton–Raphson, 94, 97, 149
- MLE, 30, 39, 43, 66, 72, 76, 78, 83, 92, 100, 102, 104–105, 111, 121, 130–131, 136, 138, 151–153, 167, 175–177, 182, 191, 196, 199, 201, 203–204, 206, 223, 226–227, 230–231, 233, 266, 282, 288, 290, 293
- MOM, 73, 76, 83, 92, 99, 102, 104–105, 121, 130–131, 138, 152–153, 167, 176–177, 191, 223, 231, 233, 266, 282, 288
- moments
- about centroid, 16, 18
- about origin, 16, 18, 71
- geometric, 16
- non-central, 66, 172, 197, 221, 258, 286
- partial or incomplete, 16
- probability weighted, 26
- moments, cumulative, 10, 31–35, 70, 73
- moments, method of, 10, 16, 20, 65, 162, *See* MOM
- moments, ordinary, 36, 69
- moments, probability weighted, 24–25, 162, *See* PWM
- moments, probability-weighted, 10
- multipliers, Lagrange, 11, 14, 61–62, 64, 75, 90, 93, 118–119, 121, 123, 146–147, 152, 164–165, 169, 190–191, 201, 204, 213, 216, 223, 226, 242, 281–282
- PDF, 3–4, 11, 30, 51, 63, 90–91, 95, 130, 141
- PDF, entropy-based, 190, 213, 242, 245, 281
- performance measure, 297, 300, 304
- bias, 42
- relative error. *See* RE
- root mean square error. *See* RMSE
- population, 37
- probability
- cumulative. *See* CDF
- density. *See* PDF
- P-value, 39, 42, 153
- PWM, 21, 28, 68–69, 73, 76, 259
- ratio, moment, 35
- ratios, L-moment, 28

ratios, moment, 17–18	modified Watson statistic, U_N^2 , 39
relation, recurrence, 115	modified Watson statistic, U_N^2 , 41
relation, recursive, 127	statistics, order, 69, 260
right-skewed, 39	
RMSE, 296, 298, 302, 306	theorem, binomial, 18, 33
	theory, entropy, 50
sample statistics, 38	TPGG. <i>See</i> Chapter 6
series, infinite, 115	transform
simulation, parametric bootstrap, 42–43	Pareto, 56
statistics	transformation
Anderson–Darling. <i>See</i> AD statistic, A_N^2	linear, 87
Cramer–von Mises. <i>See</i> CM statistic, W_N^2	monotone, 187
Kolmogorov–Smirnov. <i>See</i> KS statistic, D_N	transformation, beta distribution, 208
Liao and Shimokawa, L_N , 39, 42	transformation, linear, 118