

Index

- abcp, 227
- acceleration, 62, 183, 195–198, 200–202, 208, 211, 218–220, 225, 226, 229
- accuracy
 - first-order, 183, 201
 - second-order, 183, 201, 202, 225, 227
 - third-order, 37
- African medical facility, 203
- Akaike's information criterion (AIC), 115
- analysis of deviance, 1, 39, 88, 110, 112, 115
 - table, 40, 88, 114, 131
- analysis of variance (ANOVA), xi, 110
- ancillary statistic, 162, 163
- Anscombe's transformation, 1, 45
- apparent magnitudes, 106
- approximate bootstrap confidence (abc)
 - algorithm, 183, 192, 223–228
- astronomy, 72
- asymptotic
 - accuracy, 53, 196
 - approximation, xi, 6, 105, 195
 - distribution, 37
 - expansions, 46
- asymptotics, xii
- at risk, 117, 118
- auto accidents, 105
- auto insurance, 27
- autoregressive process, 166
- Bartlett corrections, 1, 38
- baseline hazard rate, 122, 128
- Bayes
 - correction, 29, 31
 - empirical, vii, 1, 27–31, 40, 108, 114, 141, 142, 174–176, 180, 183, 212, 213
 - family, 1, 24
 - Bayesian nonparametrics, 69
- bca intervals, 183, 195–197, 201, 202, 205, 206, 212, 222, 223, 233, 237
- bcaboot [package], 202, 206, 233
- bcajack [package], 183, 218, 221, 222
- bcapar [package], 183, 202, 203, 205, 208, 210–213, 216, 222–224, 227–229, 233, 238
- bcaplot [package], 183, 205, 206
- Behrens–Fisher problem, 183, 235
- Bernoulli variables, 94
- Bernoulli variates, 138
- beta distribution, 26, 65–67, 69, 81
- beta family, xi
- bias corrected and accelerated (bca), 183, 185, 192–195, 197–202, 206–208, 210–212, 215, 216, 218, 221–223, 225, 228, 230–234, 238
- bias corrector, 183, 195, 198, 202, 207, 211
- bimodal hypothesis, 83
- binned, 86, 87, 106, 107, 115, 118
- binomial distribution, xi, 2, 66, 67, 69, 81, 89, 141
- binomial family, 1, 2, 8, 15, 89, 134, 135, 138
- bioassay, 103, 104
- Bodleian Library, 39
- bootstrap
 - confidence intervals, 8, 60, 93, 183, 186, 190, 211, 216
 - nonparametric
 - confidence intervals, 183, 216, 221
 - sample, 154, 217
 - standard error, 217, 218, 221
 - parametric, 36, 97, 99–101, 181, 183, 191, 192, 194, 197, 200, 203, 205, 215, 216, 221, 233
 - replications, 98, 99, 154, 181, 191,

- 193, 194, 197, 198, 200, 202,
203, 206, 207, 211, 215–218,
221, 223, 226, 229, 233, 234
- samples, 79, 215, 217, 221, 233
- boundary, 14, 80, 170, 171, 173, 181
- Bradley–Terry model, 72, 104
- Brown, Lawrence D., xii, 5
- cancer
 - head and neck, 116
 - prostate, 30
 - prostate data, 1, 31, 32, 88, 108, 115,
175
 - War on Cancer and HIV, 116
- canonical link, 104
- canonical parameter, 1, 2, 42, 49
- carrying density, 2, 49, 50, 73, 90
- carrying measure, 2, 10, 49, 74, 138
- case-control studies, 103
- categorical data, 48, 222
- Cauchy translation family, 15, 166
- censored data, 88, 116, 117, 122, 125
- central limit theorem, xi, 41, 43, 56
- chemotherapy, 116, 120
- Chernoff bound, 1, 43
- chi-squared
 - distribution, 17, 40
 - family, 16
 - minimum, 147, 149
 - noncentral, 230
 - test, 21, 82, 83
- column space, 70, 92
- concave, 56, 124
- conditional
 - distribution, 21, 22, 73, 75, 76
 - family, 48, 73
 - logistic regression, 103
- conditioning, 21, 103, 128, 163, 164
- conditioning effects, 21, 171, 173
- confidence
 - density, 183, 231–234, 236–238
 - distribution, 231, 235
 - limits, 119, 184, 186, 188, 191, 195,
200, 206, 212, 215, 216,
226–229, 231–234, 236
- conjugate prior distribution, 66, 81
- conjugate priors, 1, 25, 29, 67
- consistency, 148, 151
 - Fisher, 141, 148, 149, 151, 152
- contingency table, 82, 83
- continuous hazard rate, 88, 122
- contour curves, 107, 108
- convex, 3, 5, 35, 36, 51, 170
- Cornish–Fisher expansion, 46
- count data, 18
- count vector, 48, 175, 215, 217
- counting measure, 2, 4, 16, 79, 135, 138
- covariance matrix, 50, 54, 70, 81, 127,
134, 150, 153, 157, 160–162, 166,
168, 193, 198, 203, 221, 224
- coxph [package], 125, 126, 128
- Cramér–Rao lower bound (CRLB), 13,
14, 48, 49, 53–55, 57, 61, 62, 141,
149, 152
- critical boundary, 141, 165, 170, 171
- critical point, 141, 163, 164
- cross-validation, 96
- cumulant generating function (CGF), 2,
5, 6, 8, 15, 19, 24, 48, 49, 53, 58, 63,
68, 73, 90, 127, 201, 220
- cumulants, 6, 7, 27, 58
- cumulative distribution function (CDF),
30, 42, 103, 139, 165, 170, 190,
195, 201, 226
 - bootstrap, 208, 218, 226
 - empirical, 191, 198, 200
 - logistic, 104
- curved
 - exponential family, 42, 60, 141–143,
145, 150, 156, 157, 159, 160,
162, 165–170, 172, 174, 178
 - manifold, 92, 111, 144
 - subspace, 143
 - surface, 61, 79, 147
- cytomegalovirus, 101
- data
 - categorical, 48, 222
 - censored, 88, 116, 117, 122, 125
 - count, 18
 - DTI, 177, 179, 180
 - galaxy, 88, 106–108
 - insurance, 27, 28, 212, 213, 215, 216
 - missing, vii, 141, 142, 155–158
 - NCOG, 88, 116, 118, 120, 121, 125
 - neonate, 183, 203, 204, 206
 - pediatric abandonment, 125, 127
 - prostate cancer, 1, 31, 32, 88, 108, 115,
175
 - rotation, 48, 83–87
 - spatial test, 154, 155
 - student score, 183, 185, 193, 194, 203,
218, 229, 237

- toxoplasmosis, 88, 128–132, 134, 139, 140
 transplant, 88, 95–97, 99–101
 truncated, 48, 72, 106
 ulcer, 1, 22, 74, 77, 79, 83, 227–229
 data sets, vii, 163, 183
 death probabilities, 205
 decapitated Poisson distribution, 73
 deep learning, 104, 173
 degree model, 71, 72
 delta method, 1, 14, 45, 55, 199, 201, 224
 density
 carrying, 2, 49, 50, 73, 90
 confidence, 183, 231–234, 236–238
 implied prior, 183, 237, 238
 Jeffreys uninformative prior, 232, 233
 marginal, 24, 27–29, 31, 73, 175–178, 213
 Maxwell, 84
 Maxwell–Boltzmann, 18
 normal, 46, 106–109, 238
 posterior, 1, 24, 25, 66, 175, 231, 233, 236, 237
 prior, 24, 27, 28, 32, 175–177, 214, 215, 236
 standard normal, 15, 42, 233
 truncated bivariate normal, 106, 107
 Wald, 19
 derivative matrix (Hessian), 50, 52, 55, 81, 133, 150
 deviance
 additivity theorem, 88, 112
 analysis, 1, 39, 88, 110, 112, 115
 analysis table, 40, 88, 114, 131
 least, 94
 Poisson residual, 40, 86, 107, 114
 residual, 1, 37–39, 42, 86, 95, 96, 115, 129, 130
 total, 37, 86, 94, 95, 110, 112, 115
 differential relationships, 51, 53
 diffusion tensor imaging (DTI), 141, 176
 data, 177, 179, 180
 digamma function, 65
 directional derivatives, 145, 183, 218, 220
 Dirichlet distribution, 67–69, 81
 Dirichlet family, 48, 49, 67
 discretized, 175, 176, 178
 dispersion parameter, 18, 132, 135, 140
 distribution
 beta, 26, 65–67, 69, 81
 binomial, xi, 2, 66, 67, 69, 81, 89, 141
 chi-squared, 17, 40
 conditional, 21, 22, 73, 75, 76
 confidence, 231, 235
 conjugate prior, 66, 81
 decapitated Poisson, 73
 Dirichlet, 67–69, 81
 double Poisson, 18, 88, 136
 empirical, 216, 217, 233
 fiducial, 231, 235, 238
 gamma, 2, 19, 25, 189
 gamma-Poisson, 19
 hypergeometric, 21, 22
 marginal, 28, 73
 Maxwell–Boltzmann, 17
 multinomial, 21, 67, 69, 76, 77, 79, 81, 176, 217
 multivariate normal, 75, 77, 194, 217, 229
 negative binomial, 18, 19, 88, 137
 noncentral chi-squared, 230
 normal, 2, 15, 70, 89, 110, 141, 184–186
 Poisson, 4, 18, 25, 28, 135, 136, 139
 posterior, 25, 235
 student-*t*, 234
 uninformative prior, 183, 232, 233, 236, 238
 donor/recipient match, 101
 double binomial model, 140
 double exponential family, 88, 128, 134, 135
 double Poisson distribution, 18, 88, 136
 drink preferences, 82, 83, 101, 113
 dual function, 36
 dyslexic, 176, 179
 Edgeworth expansion, xi, 6, 135, 199, 226
 effect size, 30, 31, 176
 efficiency, 54, 148
 first-order, 148, 149, 165
 second-order, 141, 149, 165
 EM algorithm, 158
 empirical Bayes, vii, 1, 27–31, 40, 108, 114, 141, 142, 174–176, 180, 183, 212, 213
 empirical distribution, 216, 217, 233
 Euclidean distance, 32, 62, 174
 expectation
 bias, 225

- parameter, 5, 11, 13, 15, 16, 41, 55, 198, 200, 209
- space, 48, 56, 91, 111
- vector, 50, 53, 70, 81, 90, 91, 110, 111, 127, 145, 168, 200, 220
- exponential tilt, 1, 3, 5, 49
- f*-modeling, 141, 175, 176
- false discovery rate, vii, 1
 - local, 31, 32, 177
- families of families, 142
- family
 - Bayes, 1, 24
 - beta, xi
 - binomial, 1, 2, 8, 15, 89, 134, 135, 138
 - Cauchy translation, 15, 166
 - chi-squared, 16
 - conditional, 48, 73
 - curved exponential, 42, 60, 141–143, 145, 150, 156, 157, 159, 160, 162, 165–170, 172, 174, 178
 - Dirichlet, 48, 49, 67
 - double exponential, 88, 128, 134, 135
 - gamma, xi, 1, 15, 89, 109
 - hidden exponential, 141, 178
 - inverse Gaussian, 1, 19
 - least favorable, 183, 219, 220, 225, 226, 229
 - multinomial, 48, 49, 77, 81, 110, 128, 147, 219
 - multiparameter exponential, 2, 10, 48–50, 55, 57, 62, 63, 73, 77, 177, 183, 200, 209, 229, 231, 233, 236, 237
 - multivariate exponential, vii, 83, 196
 - multivariate normal, 48, 49, 70
 - negative binomial, 1, 18, 20
 - normal, 1, 2, 8, 15, 20, 89, 109, 136
 - normal translation, 44, 183, 188–191, 195
 - one-parameter exponential, 1, 2, 9, 10, 12, 15–18, 20–24, 26, 44, 48, 51, 55, 58, 59, 72, 75, 89, 91, 110, 133–137, 149, 161, 198–200, 209, 210, 220, 233
 - Poisson, 1, 2, 4, 7, 15, 45, 134–137
 - Stein's least favorable, 48, 60–62, 200, 209
 - tilted hypergeometric, 20, 21, 75
 - translation, 166, 196
 - univariate exponential, vii
 - univariate normal, 48, 64, 70
 - fiducial distribution, 231, 235, 238
 - fiducial inference, 183, 186, 231, 234
 - first passage time, 19
 - first-order accuracy, 183, 201
 - first-order efficiency, 148, 149, 165
 - Fisher
 - consistency, 141, 148, 149, 151, 152
 - information, 1, 11–13, 35, 48, 54, 90, 141, 148, 161, 168, 170, 171, 178, 182
 - matrix, 91, 95, 144, 170, 172
 - observed, 22, 141, 152, 158, 159, 161, 168, 171, 172, 182
 - Fisher's
 - circle model, 141, 162, 164
 - exact test, 21, 74
 - gamma prior, 213
 - picture, 141, 145, 147, 148, 150, 158, 159
 - transformation, 183, 188, 189, 195
 - Fisher, Ronald A., xi, 21, 186
 - Fisher–Louis expressions, 141, 156–158
 - g*-modeling, 141, 173, 175, 177, 178, 180, 213
 - galaxy data, 88, 106–108
 - gamma distribution, 2, 19, 25, 189
 - gamma family, xi, 1, 15, 89, 109
 - gamma-Poisson distribution, 19
 - Gamma/Dirichlet relation, 48, 77
 - genes, 30, 31
 - genetics linkage model, 166, 167
 - glm [package], 92, 95, 97–99, 101, 107, 115, 128, 176, 204, 205
 - glmnet [package], 98–100, 102
 - globally monotonic, 63
 - gold standard, 211
 - goodness-of-fit, 214
 - gradient, 61, 90, 96, 157
 - gradient vector, 55, 61, 174, 209
 - graft-host disease, 101
 - graph models, 48, 71
 - Greenwood's formula, 88, 119
 - hazard rate, 88, 117–122, 125
 - baseline, 122, 128
 - continuous, 88, 122
 - parametric estimates, 121
 - head and neck cancer, 116
 - hidden exponential family, 141, 178
 - Hoeffding's formula, 1, 32, 34, 35, 38, 41, 48, 49, 62, 63, 111, 135, 145, 146

- Hoeffding's picture, 141, 146, 147, 150, 153, 159
 Huber's sandwich estimator, 153
 hypergeometric distribution, 21, 22
 hyperplane, 59, 60, 174, 181, 209
 i.i.d. sample, 9, 34, 43, 59, 64, 150, 157, 199, 210
 implied likelihood, 183, 231, 236–238
 implied prior density, 183, 237, 238
 independence table, 82, 113
 influence function, 90, 141, 150–153, 174
 influence lemma, 151
 insufficiency, 159
 insurance and actuarial science, 116
 insurance data, 27, 28, 212, 213, 215, 216
 intervals
 bca, 183, 195–197, 201, 202, 205, 206, 212, 222, 223, 233, 237
 bootstrap, 8, 60, 93, 183, 186, 190, 211, 216
 nonparametric bootstrap, 183, 216, 221
 standard, 183, 184, 186, 187, 192–195, 199, 201, 202, 205, 206, 218, 221, 223–225, 228–230
 inverse Gaussian family, 1, 19
 isopaths, 63
 jackknife, 183, 210–212, 221
 Jeffreys uninformative prior density, 232, 233
 Kaplan–Meier curve, 88, 119
 known coefficient of variation, 165
 Koopman–Darmois–Pitman families, xi, 9
 Kullback–Leibler distance, 33
 kurtosis, 1, 6–8, 16, 17, 20, 37, 136, 238
 large deviations, 1, 43
 lasso, 98, 173
 LD50, 103
 least deviance, 94
 least favorable family, 183, 219, 220, 225, 226, 229
 least squares algorithm, 89
 Lebesgue measure, 15, 73
 Left/Right, 194
 Lehmann alternatives, 122
 level surface, 147–149, 156, 209, 226, 229
 life table, 88, 117, 118, 120
 likelihood
 implied, 183, 231, 236–238
 normal, 47, 63
 partial, 88, 123, 124, 128
 Poisson, 85
 quasi-, 20, 88, 128, 131–134, 136
 likelihood function, 23, 24, 41, 53, 127, 163, 236
 Lindsey's method, 81, 88, 108–110, 115
 linear projection, 60
 local
 false discovery rate, 31, 32, 177
 linear approximation, 56, 149
 minimum, 164
 locally most powerful tests, 161
 log likelihood, 12, 34, 47, 56, 57, 62, 98, 114, 115, 144, 150, 173, 179
 log likelihood function, 11, 54, 139, 144, 166, 173
 log odds, 21–23, 75, 77
 logistic CDF, 104
 logistic regression, vii, xi, 64, 88, 89, 94–105, 110, 128–131, 134, 183, 204–206
 multicategory, 81, 101, 102, 104
 logistic transform, 94, 120
 lost to follow-up, 116–118, 123
 Louis, Tom, 157
 lower-dimensional subspace, 50
 Lugananni–Rice formula, 1, 42, 43
 machine learning, 89, 104
 Mahalanobis distance, 164, 169
 marginal density, 24, 27–29, 31, 73, 175–178, 213
 marginal distribution, 28, 73
 Markov chain Monte Carlo (MCMC), 72
 matching priors, 233
 maxeig statistic, 183, 194
 maximum likelihood estimate (MLE), 11–14, 26, 29, 34, 37, 44, 49, 53–57, 59, 62, 69, 85, 88, 91, 92, 94–96, 98, 105, 109–111, 114, 132–134, 139–141, 145–147, 149–153, 156–159, 163–173, 178–180, 184, 186, 187, 190, 194, 197, 198, 200, 204, 208, 209, 213, 220, 224, 233
 nonparametric, 216, 217
 maximum likelihood estimation, xi, 10, 34, 48, 49, 51, 53, 55, 57, 59, 60, 72, 91, 92, 103, 127, 145, 147–149, 159, 167
 penalized, 98, 141, 168, 173, 174, 179, 180, 213, 215

- Maxwell density, 84
- Maxwell–Boltzmann
 - density, 18
 - distribution, 17
- McCullagh and Nelder, xi, 37, 133
- microarray, 31
- microarray example, 1, 29
- minimum chi-squared, 147, 149
- missing data, vii, 141, 142, 155–158
- mixture, 83, 84
- model misspecification, 152
- moment relationships, 1, 5, 6, 58
- monotone
 - function, 11, 196, 198
 - global, 63
 - increasing function, 188, 190, 201
 - transformation, 161, 191, 192, 195, 226
- Monte Carlo error, 183, 207, 210–212, 221
- multicategory logistic regression, 81, 101, 102, 104
- multinomial
 - coefficient, 79
 - distribution, 21, 67, 69, 76, 77, 79, 81, 176, 217
 - family, 48, 49, 77, 81, 110, 128, 147, 219
- multiparameter exponential family, 2, 10, 48–50, 55, 57, 62, 63, 73, 77, 177, 183, 200, 209, 229, 231, 233, 236, 237
- multivariate
 - analysis, xi, 70, 77
 - exponential family, vii, 83, 196
 - normal distribution, 75, 77, 194, 217, 229
 - normal family, 48, 49, 70
- mutual information, 33
- naming curvature, 226
- National Football League (NFL), 72
- natural parameter, 9, 10, 24, 48, 53, 58, 68, 73, 75, 76, 88–90, 92, 94, 103–105, 127, 136, 143, 167, 177, 204
- natural parameter space, 2, 48, 49, 58, 79, 80, 143
- negative binomial distribution, 18, 19, 88, 137
- negative binomial family, 1, 18, 20
- neonate data, 183, 203, 204, 206
- network theory, 71
- Newton–Raphson, 91
- Neyman’s construction, 183, 187, 190, 208
- Neyman–Pearson lemma, 14
- nlm [package], 140, 179
- nlm [package], 158
- nlminb [package], 85
- noncentral chi-squared distribution, 230
- noncoverage probability, 184, 185, 187, 188, 192
- nonparametric bootstrap
 - confidence intervals, 183, 216, 221
 - sample, 154, 217
 - standard error, 217, 218, 221
- nonparametric delta method, 141, 154
- nonparametric MLE, 216, 217
- normal
 - approximation, 37, 41, 91, 92, 124, 188, 204
 - density, 46, 106–109, 238
 - distribution, 2, 15, 70, 89, 110, 141, 184–186
 - family, 1, 2, 8, 15, 20, 89, 109, 136
 - likelihood, 47, 63
 - translation family, 44, 183, 188–191, 195
- normalizing function, 2, 5, 9, 15, 49, 72
- Northern California Oncology Group (NCOG), 116, 119
 - data, 88, 116, 118, 120, 121, 125
- null hypothesis, 14, 21, 30, 82, 86, 111, 125, 131
 - of independence, 74, 82, 113, 114
- observed Fisher information, 22, 141, 152, 158, 159, 161, 168, 171, 172, 182
- offset, 93, 105, 174
- one-parameter exponential family, 1, 2, 9, 10, 12, 15–18, 20–24, 26, 44, 48, 51, 55, 58, 59, 72, 75, 89, 91, 110, 133–137, 149, 161, 198–200, 209, 210, 220, 233
- one-parameter subfamilies, 48, 57, 59–61, 81, 143, 159, 170
- ordinary least squares (OLS), 48, 69, 92, 132
- orthogonal, 59–61, 70, 92, 111, 145–149, 153, 169, 171, 209, 219, 220
- orthonormal matrix, 70

- overdispersion, 18, 88, 128–134, 137, 139, 140
- p -dimensional simplex, 67
- paired comparisons, 104
- parametric
 - bootstrap, 36, 97, 99–101, 181, 183, 191, 192, 194, 197, 200, 203, 205, 215, 216, 221, 233
 - survival analysis, 120
- parametric hazard rate estimates, 121
- partial likelihood, 88, 123, 124, 128
- Pearson correlation coefficient, 184
- Pearson residual, 37–39, 42, 129, 130, 134
- pediatric abandonment data, 125, 127
- pediatric abandonment study, 88, 125, 126
- penalized maximum likelihood (pMLE), 98, 141, 168, 173, 174, 179, 180, 213, 215
- penalty function, 173, 179
- percentile method, 183, 190–193, 195, 233
- phenotypes, 166
- pivotal quantity, 235
- Poisson
 - decapitated distribution, 73
 - deviance residuals, 40, 86, 107, 114
 - distribution, 4, 18, 25, 28, 135, 136, 139
 - double distribution, 18, 88, 136
 - family, 1, 2, 4, 7, 15, 45, 134–137
 - likelihood, 85
 - regression, vii, 83, 88, 104–107, 109, 115, 176
 - trick, 48, 76, 77, 81, 83, 85, 109, 113, 229
- Poisson/multinomial connection, 76, 77
- positive definite, 50, 51, 56, 63, 170
- posterior
 - density, 1, 24, 25, 66, 175, 231, 233, 236, 237
 - distribution, 25, 235
 - expectation, 26, 28, 66, 214
- prior density, 24, 27, 28, 32, 175–177, 214, 215, 236
 - implied, 183, 237, 238
 - Jeffreys uninformative, 232, 233
- probability of death, 118, 206
- probit
 - analysis, 88, 103, 104
 - link, 104
 - model, 103
- projection directions, 60, 146
- proportional
 - distance, 164
 - hazards, vii, 125, 127, 128
 - hazards model, 81, 88, 121–123, 127
- prostate cancer, 30
- prostate cancer data, 1, 31, 32, 88, 108, 115, 175
- Pythagoras, 112
- quasi-likelihood, 20, 88, 128, 131–134, 136
- R, 24, 85, 92, 95, 98, 125, 140, 179, 202, 213, 221
- regression
 - conditional logistic, 103
 - logistic, vii, xi, 64, 88, 89, 94–105, 110, 128–131, 134, 183, 204–206
 - multicategory logistic, 81, 101, 102, 104
 - Poisson, vii, 83, 88, 104–107, 109, 115, 176
- regularization, 98, 100, 173, 179
- renormalize, 3, 22
- repeated sampling, 1, 2, 6, 9, 34, 37, 46, 48, 49, 52, 54, 56, 141, 150, 161, 164, 186, 199, 201
- ridge regression, 173
- risk set, 88, 123, 127, 128
- Robbins' formula, 28, 29, 40
- rotation data, 48, 83–87
- saddlepoint approximation, 1, 40–42
- sample size, 12, 24, 26, 40, 54, 56, 77, 94, 98, 109, 110, 138, 154, 159, 161, 191, 199, 201, 217
- sample space, 2, 3, 51, 53, 56, 67, 72, 79, 91, 109, 157, 175, 178, 179
- sampling error, 210
- score function, 11–13, 48, 49, 53, 54, 56, 59, 88, 90, 91, 133, 139, 141, 144, 156, 157, 174, 178
- second derivative lemma, 141, 144
- second derivative matrix, 50, 52, 54, 56, 57, 144
- second-order accuracy, 183, 201, 202, 225, 227
- second-order efficiency, 141, 149, 165
- selection bias, 31
- self-grouping property, 94

- Shakespeare, William, 39, 40
- singular value decomposition, 24
- skewness, 1, 6–8, 16, 17, 19, 20, 37, 38, 46, 136, 198, 201, 220, 226, 229, 234, 238
- softmax, 102
- spatial test data, 154, 155
- spherical cap, 181
- spike and slab, 179, 180
- stabilized variance, 45
- stable region, 141, 170, 173, 180, 181
- standard intervals, 183, 184, 186, 187, 192–195, 199, 201, 202, 205, 206, 218, 221, 223–225, 228–230
- standard normal density, 15, 42, 233
- statistical curvature, 141, 142, 159, 161, 168
- Stein's least favorable family (LFF), 48, 60–62, 200, 209
- Stieltjes form, 73
- structure, vii, 1, 9, 23, 88, 107, 133, 155, 156, 179, 186, 202
- student score data, 183, 185, 193, 194, 203, 218, 229, 237
- student-*t* distribution, 234
- sufficiency, 9, 53, 54, 157, 159, 160
- sufficient statistic, 1, 2, 9, 10, 24, 26, 41, 48, 49, 58, 64, 73, 76, 79, 93, 94, 103, 127, 135, 136, 149, 150, 159, 175, 198, 220, 235
- Sundberg, Rolf, xii
- survival [package], 125
- survival analysis, vii, 88, 116–118, 122
 - parametric, 120
- survival function, 117, 122
- symmetric matrix, 50, 70, 152, 168
- Taylor series, xi, 6, 14, 63, 99, 152, 167, 223, 224
- Taylor, Gary, 39
- third-order accuracy, 37
- three-way array, 52
- tilted hypergeometric family, 20, 21, 75
- tilting, 3, 10, 49
 - exponential, 1, 3, 5
- tolerance, 103
- total deviance, 37, 86, 94, 110, 112, 115
- toxoplasmosis data, 88, 128–132, 134, 139, 140
- toy example, 141, 171, 172, 181
- trace, 225
- transformation
 - invariance, 183, 188, 190, 192, 193, 202, 228
 - of coordinates, 168, 173, 180
 - theory, 1, 44
- translation family, 166, 196
 - Cauchy, 15, 166
 - normal, 44, 183, 188–191, 195
- transplant data, 88, 95–97, 99–101
- transplant study, 95, 101
- truncated bivariate normal density, 106, 107
- truncated data, 48, 72, 106
- Tweedie's formula, 1, 26, 29, 32, 176, 177
- Twentieth Century statistics, xi
- ulcer data, 1, 22, 74, 77, 79, 83, 227–229
- unbiased estimate, 1, 8, 13, 17, 31, 55, 69, 115, 119, 132
- unbiased estimator, 13, 54, 55, 77
- uniformly most powerful (UMP), 14, 15
- uninformative prior distribution, 183, 232, 233, 236, 238
- univariate exponential family, vii
- univariate normal family, 48, 64, 70
- variance
 - analysis of (ANOVA), xi, 110
 - function, 15, 16, 133, 135
 - matrix, 53, 61, 90, 152
 - stabilized, 45
- voxels, 176
- Wald density, 19
- War on Cancer and HIV, 116
- Wiener process, 19
- Wikipedia, 68
- Wilks' likelihood ratio test, 86
- Wilson–Hilferty transformation, 1, 47
- winner's curse, 31
- Wishart statistic, 48, 75, 76
- z*-value, 30, 31, 96, 115, 127, 128, 130, 176, 180, 204