

Index

- analytic simulation, 318
- anomalous diffusion, 241, 335
- area fire, 171
- attrition rate, 172
- autocorrelation, 282

- balance equations, 117, 266
- binary integer programming problem, 100
- binomial distribution, 318, 349
- binomial formula, 351
- bombing run problem, 317, 350, 351
- branch-and-bound, 93
- Brownian motion, 236, 345

- capacitor, 150
- cargo problem, 54, 106
- cell division problem, 294, 349
- center of mass, 229
- central limit theorem, 232, 236, 325, 332
- chaos, 191, 215
- characteristic equation, 144
- checkout line problem, 245, 349
- color TV problem, 21, 32, 51, 104, 106, 109
- complete graph, 58
- complex absolute value, 146
- computer algebra system, 25, 61, 290
- conditional probability, 229
- conservation of mass, 236
- constrained optimization, 32
- constraints, 32
- continuous random variable, 228
- continuous-time simulation, 179
- correlation, 281
- covariance, 280

- Cramer's rule, 118
- current, 151

- decision variable, 38
- density function, 228
- diffusion equation, 324
- diffusion with drift, 325
- dimension, 195
- diode problem, 224, 241, 242
- direct fire, 171
- dirt problem, 83, 99, 109
- discrete random variable, 224
- discrete-time dynamical system, 127
- discrete-time simulation, 172
- dispersion, 333
- distribution function, 228
- docking problem, 127, 136, 145, 167, 168, 208, 308, 348
- dynamic model, 116
- dynamical system, 121

- eigenvalue, 140, 201
- eigenvalue method, 140, 146
- eigenvector, 140
- electrical circuit, 150
- equilibrium, 117
- ergodic Markov chain, 256
- ergodic Markov process, 266
- Euler method, 186
- expected value, 224, 229
- exponential distribution, 229
- exponential random variable, 311
- extended central limit theorem, 337

- facility location problem, 66, 104, 296
- farm problem, 75, 91
- feasible region, 38

- Fick's Law, 237, 345
first passage time, 311
five-step method, 4, 25
flood problem, 292
forklift problem, 261
Fourier transform, 325, 336
fractals, 191, 195, 334, 345, 346
fractional calculus, 335
fractional derivative, 336
fractional diffusion equation, 336

goodness of fit, 274
gradient vector, 33
graphical method, 58
grid search, 68

heart attack problem, 245
heat island, 324
heavy tail, 343
home mortgage problem, 271, 295, 296
homeomorphism, 152
house fire problem, 231, 243

independent random variables, 226
inductor, 150
infectious disease problem, 136, 208
integer programming, 92
intrinsic growth rate, 116
inventory problem, 251, 290, 347, 349
iteration function, 146, 162

Kirchoff's current law, 151
Kirchoff's voltage law, 151

Lagrange multipliers, 32
Lanchester model, 135
lawn chair problem, 70, 106
limit cycle, 187
linear approximation, 140, 147, 162
linear contraction, 147
linear programming, 75
linear regression, 273

Markov chain, 252
Markov decision theory, 260
Markov process, 261, 292
Markov property, 262, 309

Measures of performance, 302, 309, 310
memoryless property, 229, 262
Monte Carlo simulation, 302, 323, 325
multiple regression, 296
multivariable chain rule, 29, 44
Murphy's Law, 244, 269

newspaper problem, 18, 52, 53, 105, 106
Newton's method, 62, 72
nonlinear programming, 75
normal distribution, 232, 313, 325

objective function, 34
one-variable optimization, 6
outliers, 278

particle tracking, 324
pendulum problem, 214
phase portrait, 152
pig problem, 4, 16, 18, 57, 102, 103
Poisson distribution, 243, 252
Poisson process, 231
pollution problem, 236, 248, 249, 324
polynomial least squares, 296
predator-prey problem, 135, 165, 211
price elasticity, 25
probability distribution, 224

queuing model, 270

R-squared statistic, 275
radioactive decay problem, 228, 242
rainy day problem, 301, 349, 352
random arrivals, 229
random search, 68
random variable, 310
range of normal variation, 234
rate diagram, 263
residual, 278, 283
resistor, 150
RLC circuit problem, 151, 159, 166, 167, 186, 212–214
robustness, 14
Runge-Kutta method, 215

sample mean, 330

- sample standard deviation, 331
- sample variance, 330
- scanning sensor problem, 246, 351
- self-similar, 195
- sensitivity, 12, 65
- sensitivity analysis, 9
- shadow price, 47, 49
- simplex method, 77
- slack variable, 77
- spreadsheet, 83, 100, 189
- stable, 120, 128
- stable distribution, 336
- stable motion, 346
- standard normal distribution, 233
- state space, 117, 127
- state transition diagram, 253
- state transition matrix, 253
- state transition probability, 253
- state variable, 117, 127
- statistical inference, 232
- statistically significant, 234
- steady state, 116
- steady-state distribution, 255
- stock market problem, 291
- strange attractor, 205
- strong law of large numbers, 225, 302, 332
- supply and demand problem, 135, 166
- Surface-to-air missile, 317

- taxicab problem, 244, 349
- time series model, 279
- tree problem, 116, 132, 133, 139, 166, 169, 211
- truncation effect, 344

- unconstrained optimization, 22
- uniform distribution, 311

- v-i characteristic, 151
- variance, 232
- vector field, 122
- velocity vector, 122
- voltage, 151

- war problem, 135, 172, 206, 207
- water pollution problem, 335
- weather problem, 200, 218
- whale problem, 17, 50, 51, 104, 121, 133, 134, 164, 165, 178, 193, 208–210, 212, 215