
Index

- σ -algebra, 4
- σ -field, 4
- σ -finite measure, 20

- absolutely continuous, 17, 24
- adapted process, 43
- algebra, 3
- almost surely (a.s.), 19
- atoms, 5, 14

- Bayes' Theorem, 131
- Borel field, 4
- Borel sets, 4
- Bounded Convergence Theorem, 21
- Brownian motion with drift, 72

- calibration, 219
- capture–recapture, 242
- Cauchy–Schwarz inequality, 26
- certain event, 3
- change of variable formula in
 Lebesgue integral, 22
- Chebyshev–Markov inequality, 26
- class D, 64
- class D supermartingale, 64
- coarser field, 14
- compensator, 57, 65, 124
- complete filtration, 7
- complete σ -field, 7
- Conditional Bayes' Theorem, 132
- conditional independence, 11
- conditional probability given \mathcal{G} , 10
- continuity of probability, 7
- continuous almost surely, 42
- continuous in L^p , 42
- continuous in probability, 42
- convenience yield, 224
- converges almost surely, 19
- converges in distribution, 27
- converges in probability, 27
- correlation coefficient, 26
- counting measure, 123
- counting process, 65, 75

- covariance, 26
- cylinder set, 8, 18

- direct product, 23
- discrete time Itô formula, 83
- Doob–Meyer special semimartingale
 representation, 65

- EM algorithm, 177, 196
- events, 3, 4
- expected value of a random variable, 20

- Fatou's Lemma, 21
- field, 3
- filtered probability space, 7
- filtration, 5
- finite variation function, 62
- first passage time, 49

- Gaussian random variable, 70

- hitting time, 46
- homogeneous Markov chain, 57, 67

- impossible event, 3
- increasing process, 45, 64
- independent events, 11
- independent increments, 38
- indicator function, 14
- indistinguishable processes, 42
- infinite variation function, 62
- infinitely often (i.o.), 13
- infinitesimal generator, 68
- integer valued measure, 123
- integrable random variable, 20
- integrable variation, 62, 97, 98
- integration by parts formula, 83
- Itô formula for Brownian motion, 108
- Itô formula for continuous bounded
 semimartingales, 98

- Jensen's Inequality, 51

- Kolmogorov's backward differential system, 68
- Kolmogorov's Existence Theorem, 45
- Kolmogorov's forward differential system, 68
- Lévy system, 41
- Lévy's characterization of the Poisson process, 107
- Lebesgue measure, 20
- Lebesgue's Dominated Convergence Theorem, 21
- left continuity of a filtration, 6
- likelihood ratio, 25
- local martingale, 55, 61
- local square integrable martingale, 61
- localizing sequence, 61
- locally bounded process, 96
- locally uniformly integrable martingale, 96
- Markov chain, 57, 67
- Markov process, 50
- Markov property, 50, 57
- Markov time, 46
- martingale, 50, 59
- Martingale Convergence Theorem, 60
- martingale transform, 56, 83
- mean of a random variable, 20
- measurable sets, 4
- measurable space, 4
- measurable stochastic process, 44
- measure, 19
- measure of jumps, 125
- measure space, 19
- modification process, 42
- modified Kalman filter, 226
- Monotone Convergence Theorem, 20
- multinomial distribution, 37
- natural filtration, 43
- negligible events, 7
- normalized random variable, 26
- null events, 7
- optional covariation, 80
- optional process, 45
- optional quadratic variation, 80, 85, 86
- optional time, 46, 49
- orthogonal martingales, 82, 86
- passage time of Brownian motion, 76
- point function, 123
- point processes, 124
- Poisson process, 75
- Poisson process with drift, 161
- Poisson random measure, 126
- posterior probability, 9
- power class, 4
- predictable covariation, 80
- predictable process, 45
- predictable quadratic variation, 80, 85
- probability density function, 17, 18
- probability distribution function, 17
- probability measure, 6
- probability space, 7
- probability transition matrix, 58
- product σ -field, 23
- product probability measure, 8
- product rule, 118
- progressively measurable process, 44
- Radon–Nikodym derivative, 25
- Radon–Nikodym Theorem, 24
- random measure, 123
- random variable, 14
- regular martingale, 52
- right-continuity of a filtration, 6
- right-continuous process, 42
- right-continuous with left limits process, 42
- sample path continuity, 42
- sample space, 3
- semimartingale, 57, 63
- semimartingale representation of a Markov chain, 58, 69
- simple event, 3
- simple function, 15, 92
- special semimartingale, 63
- square integrable process, 61, 80
- standard deviation, 26
- standard one-dimensional Brownian motion, 70
- stationary increments, 38
- stochastic basis, 7
- stochastic exponential, 113
- stochastic integral, 83
- stochastic process, 38
- stopping time, 46
- Stratonovitch integral, 83
- strong Markov property, 50
- submartingale, 50, 59
- supermartingale, 50, 59
- time-change for martingales, 87
- transition semigroup, 67
- uniform integrability, 27
- up-crossings theorem, 52
- usual conditions, 7
- variance, 26
- variation of a function, 62
- volatility, 219
- volatility estimation, 217
- weak solution, 149