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## List of Abbreviations and Symbols

We have tried as much as possible to use uniquely defined abbreviations and symbols. In various cases, however, symbols can have different meanings in different sections. The list below gives the most typical usage. Commonly-used mathematical symbols are not explained here.

Abbreviation or Symbol	Explanation	p.
a.s.	almost sure, almost surely, with probability 1	
a.e.	almost everywhere, almost every	
$\text{Bin}(n, p)$	binomial distribution with parameters $(n, p)$ : $p(k) = \binom{n}{k} p^k (1-p)^{n-k}$ , $k = 0, \dots, n$	
$\mathbb{C}$	set of the complex numbers	
$\text{corr}(X, Y)$	correlation between the random variables $X$ and $Y$	
$\text{cov}(X, Y)$	covariance between the random variables $X$ and $Y$	
$E_F X$	expectation of $X$ with respect to the distribution $F$	
$e_F(u)$	mean excess function	94
$\text{Exp}(\lambda)$	exponential distribution with parameter $\lambda$ : $F(x) = 1 - e^{-\lambda x}$ , $x > 0$	
$F$	distribution function/distribution of a random variable	
$F_A$	distribution function/distribution of the random variable $A$	
$F_I$	integrated tail distribution: $F_I(x) = (E_F X)^{-1} \int_0^x \overline{F}(y) dy$ , $x \geq 0$	167
$F_n$	empirical (sample) distribution function	89
$F^{\leftarrow}(p)$	$p$ -quantile/quantile function of $F$	89
$F_n^{\leftarrow}(p)$	empirical $p$ -quantile	90
$\overline{F}$	tail of the distribution function $F$ : $\overline{F} = 1 - F$	
$F^{n*}$	$n$ -fold convolution of the distribution function/distribution $F$	
$\widehat{f}_X$	Laplace-Stieltjes transform of the random variable $X$ :	

	$\widehat{f}_X(s) = Ee^{-sX}, s > 0$	177
$\Gamma$	gamma function : $\Gamma(x) = \int_0^\infty t^{x-1} e^{-t} dt$	
$\Gamma(\gamma, \beta)$	gamma distribution with parameters $\gamma$ and $\beta$ : gamma density $f(x) = \beta^\gamma (\Gamma(\gamma))^{-1} x^{\gamma-1} e^{-\beta x}, x > 0$	
IBNR	incurred but not reported claim	48
$I_A$	indicator function of the set (event) $A$	
iid	independent, identically distributed	
$\lambda$	intensity or intensity function of a Poisson process	15
$\Lambda$	Gumbel distribution: $\Lambda(x) = \exp\{-e^{-x}\}, x \in \mathbb{R}$	154
Leb	Lebesgue measure	
$\log x$	logarithm with basis $e$	
$\log^+ x$	$\log^+ x = \max(\log x, 0)$	
$L(x)$	slowly varying function	105
$M_n$	maximum of $X_1, \dots, X_n$	
$\mu(t)$	mean value function of a Poisson process on $[0, \infty)$	14
$\mathbb{N}$	set of the positive integers	
$\mathbb{N}_0$	set of the non-negative integers	
$N, N(t)$	claim number or claim number process	7
$\tilde{N}$	often a homogeneous Poisson process	
$N(\mu, \sigma^2)$	Gaussian (normal) distribution with mean $\mu$ , variance $\sigma^2$	
$N(0, 1)$	standard normal distribution	
$N(\mu, \Sigma)$	multivariate Gaussian (normal) distribution with mean vector $\mu$ and covariance matrix $\Sigma$	
NPC	net profit condition	159
$o(1)$	$h(x) = o(1)$ as $x \rightarrow x_0 \in [-\infty, \infty]$ means that $\lim_{x \rightarrow x_0} h(x) = 0$	20
$\omega$	$\omega \in \Omega$ random outcome	
$(\Omega, \mathcal{F}, P)$	probability space	
$\phi_X(t)$	characteristic function of the random variable $X$ : $\phi_X(t) = Ee^{itX}, t \in \mathbb{R}$	
$\Phi$	standard normal distribution/distribution function	
$\Phi_\alpha$	Frechet distribution: $\Phi_\alpha(x) = \exp\{-x^{-\alpha}\}, x > 0$	154
Pois( $\lambda$ )	Poisson distribution with parameter $\lambda$ : $p(n) = e^{-\lambda} \lambda^n / n!, n \in \mathbb{N}_0$	
PRM	Poisson random measure	
PRM( $\mu$ )	Poisson random measure with mean measure $\mu$	46
$\psi(u)$	ruin probability	157
$\Psi_\alpha$	Weibull (extreme value) distribution: $\Psi_\alpha(x) = \exp\{-(-x)^\alpha\}, x < 0$	154
$\mathbb{R}, \mathbb{R}^1$	real line	
$\mathbb{R}_+$	$\mathbb{R}_+ = (0, \infty)$	
$\mathbb{R}^d$	$d$ -dimensional Euclidean space	
$\rho$	safety loading	85
$\rho(\widehat{\mu})$	(quadratic) Bayes or linear Bayes risk of $\widehat{\mu}$	194



$S$	class of the subexponential distributions	109
$\text{sign}(a)$	sign of the real number $a$	
$S_n$	cumulative sum of $X_1, \dots, X_n$	
$S, S(t)$	total, aggregate claim amount process	8
$t$	time, index of a stochastic process	
$t_\nu$	student $t$ -distribution with $\nu$ degrees of freedom	
	$t_\nu$ -density for $x \in \mathbb{R}, \nu > 0,$ $f(x) = \Gamma((\nu + 1)/2) (\sqrt{\pi\nu}\Gamma(\nu/2))^{-1} (1 + x^2/\nu)^{-(\nu+1)/2}$	
$T_i$	arrival times of a claim number process	7
$u$	initial capital	156
$U(a, b)$	uniform distribution on $(a, b)$	
$U(t)$	risk process	156
$\text{var}(X)$	variance of the random variable $X$	
$\text{var}_F(X)$	variance of a random variable $X$ with distribution $F$	
$X_n$	claim size	7
$X_{(n-i+1)}$	$i$ th largest order statistic in the sample $X_1, \dots, X_n$	28
$\bar{X}_n$	sample mean	
$\mathbb{Z}$	set of the integers	
$\sim$	$X \sim F$ : $X$ has distribution $F$	
$\approx$	$a(x) \approx b(x)$ as $x \rightarrow x_0$ means that $a(x)$ is approximately (roughly) of the same order as $b(x)$ as $x \rightarrow x_0$ . It is only used in a heuristic sense.	
$*$	convolution or bootstrapped quantity	
$\ \cdot\ $	$\ x\ $ norm of $x$	
$[\cdot]$	$[x]$ integer part of $x$	
$\{\cdot\}$	$\{x\}$ fractional part of $x$	
$x_+$	positive part of a number: $x_+ = \max(0, x)$	
$B^c$	complement of the set $B$	
$\xrightarrow{\text{a.s.}}$	$A_n \xrightarrow{\text{a.s.}} A$ : a.s. convergence	
$\xrightarrow{d}$	$A_n \xrightarrow{d} A$ : convergence in distribution	
$\xrightarrow{P}$	$A_n \xrightarrow{P} A$ : convergence in probability	
$\stackrel{d}{=}$	$A \stackrel{d}{=} B$ : $A$ and $B$ have the same distribution	

For a function  $f$  on  $\mathbb{R}$  and intervals  $(a, b]$ ,  $a < b$ , we write  $f(a, b] = f(b) - f(a)$ .

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