Documentation: *khermisc.sty*

Klaus Herrmann

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Symbols defined in *khermisc*

The defined symbols are grouped by different areas of mathematics (as far as such a grouping is possible) and can be made available by enabling the options of the package. This allows to only import the definitions and commands that are needed for a specific project. The overloaded syntax is made possible by using `\NewDocumentCommand` of the *xparse* package, and as such optional parameters for the commands are in square brackets and come before the mandatory parameters in curly brackets. For exampe, in case of the indicator function it is mandatory to supply a set as an argument, while an evaluation point is optional. The usage is therefore `\ind{A}` for the function $\mathbb{1}_A$, while `\ind[x]{A}` adds the evaluation point $\mathbb{1}_A(x)$.

General symbols - available by default

Symbol	Name	Definition
$a := b$	left hand side definition: a is defined by b	`a \ldef b`
$a =: b$	right hand side definition: b is defined by a	`a \rdef b`

Symbols in option *sets*

Symbol	Name	Definition
$\mathbb{N}$	natural numbers	`\N`
$\mathbb{Z}$	integers	`\Z`
$\mathbb{Q}$	rational numbers	`\Q`
$\mathbb{R}$	real numbers	`\R`
$\overline{\mathbb{R}}$	extended real numbers	`\Rbar`
$\mathbb{C}$	complex numbers	`\C`
$\mathbb{C}$	complex numbers (in case backslash C is already defined)	`\CN`
$\mathcal{P}(E)$	power set of E	`\PowerSet(E)`

Symbols in option *real*

Symbol	Name	Definition
e	Euler's number	`\e`
argmin	arg min	`\argmin`
argmax	arg max	`\argmax`
$\abs{x}$	absolute value of x	`\abs{x}`
d	straight differential for integrals and derivatives (depreciated)	`\d`
$\diff$	straight differential for integrals and derivatives	`\diff`
$\diff[2]$	straight differential with power for integrals and derivatives	`\diff[2]`
$\norm{x}$	norm of x	`\norm{x}`
$\norm[L^2]{x}$	norm of x with subscript	`\norm[L^2]{x}`
vol	volume operator	`\vol`
$\vol[A]$	volume of A	`\vol[A]`
$\ind{A}$	indicator function of set A	`\ind{A}`
$\ind[x]{A}$	indicator function of A evaluated at $x \in \mathbb{R}$	`\ind[x]{A}`
$\floor{x}$	largest integer smaller than x	`\floor{x}`
$\ceil{x}$	smallest integer larger than x	`\ceil{x}`
sinc	sinc function $\mathrm{sinc}(x) = \sin(x)/x$	`\sinc`
o	small o	`\landau`
$\mathcal{O}$	big O	`\Landau`
$\sprod$	scalar product symbol	`\sprod`
$\sprod[][][X]$	scalar product X	`\sprod[][][X]`
$\sprod[x][y][X]$	scalar product X of x and y	`\sprod[x][y][X]`
$\sprod[x][y]$	scalar product of x and y	`\sprod[x][y]`

Symbols in option *complex*

Symbol	Name	Definition
i	imaginary unit	`\iu`
Re	real part of imaginary number	`\re`
$\re[z]$	real part of imaginary number z	`\re[z]`
Im	imaginary part of imaginary number	`\im`
$\im[z]$	imaginary part of imaginary number z	`\im[z]`

Symbols in option *measure*

Symbol	Name	Definition
ess sup	essential supremum	`\esup`
ess inf	essential infimum	`\einf`
$\mathscr{D}$	Dynkin system	`\Dynkin`
τ	topology	`\Topology`
$\mathscr{B}(\mathbb{R})$	Borel sigma algebra	`\Borel(\R)`
λ	Lebesgue measure	`\leb`
$f_\sharp\mu$	push forward measure of μ under f	`\pfm{\mu}{f}`
d	metric symbol	`\metric`
d_X	metric on X	`\metric[][][X]`

$\mathrm{d}_X(x, y)$	metric on X of x and y	`\metric[x][y][X]`
$\mathrm{d}(x, y)$	metric of x and y	`\metric[x][y]`
$f_n \xrightarrow{a.e.} f$	f_n converges to f almost everywhere	`f_n \cae f`
$f_n \xrightarrow{\mu\ a.e.} f$	f_n converges to f almost everywhere w.r.t. μ	`f_n \cae[\mu] f`
$f \overset{a.e.}{=} g$	f is equal to g almost everywhere	`f \eqae g`
$f \overset{\mu\ a.e.}{=} g$	f is equal to g almost everywhere w.r.t. μ	`f \eqae[\mu] g`
$f \overset{a.e.}{\neq} g$	f is not equal to g almost everywhere	`f \neqae g`
$f \overset{\mu\ a.e.}{\neq} g$	f is not equal to g almost everywhere w.r.t. μ	`f \neqae[\mu] g`

Symbols in option *prob*

Symbol	**Name**	**Definition**
$X \perp\!\!\!\perp Y$	X is independent of Y	`X \indep Y`
Ω	Probability space	`\PSpace`
$\mathscr{F}$	Sigma algebra based on letter F	`\SigAlgF`
$X_n \xrightarrow{d} X$	X_n converges to X in distribution	`X_n \indist X`
$X_n \xrightarrow{a.s.} X$	X_n converges to X almost surely	`X_n \as X`
$X_n \xrightarrow{p.s.} X$	X_n converges to X presque sûrement	`X_n \ps X`
$X_n \xrightarrow{L^p} X$	X_n converges to X in L^p	`X_n \inLp{p} X`
$X_n \xrightarrow{\mathbb{P}} X$	X_n converges to X in probability	`X_n \inprob X`
$X \overset{d}{=} Y$	X is equal to Y in distribution	`X \eqindist Y`
$X \overset{a.s.}{=} Y$	X is equal to Y almost surely	`X \eqas Y`
$X \overset{a.s.}{\neq} Y$	X is not equal to Y almost surely	`X \neqas Y`
$X \overset{p.s.}{=} Y$	X is equal to Y presque sûrement	`X \eqps Y`
$X \overset{p.s.}{\neq} Y$	X is not equal to Y presque sûrement	`X \neqps Y`
$o_{a.s.}$	little o almost surely	`\landauAS`
$\mathcal{O}_{a.s.}$	big O almost surely	`\LandauAS`
$o_{\mathbb{P}}$	little o in probability	`\landauP`
$\mathcal{O}_{\mathbb{P}}$	big O in probability	`\LandauP`
cov	covariance operator	`\cov`
$\mathrm{cov}[X, X]$	covariance of X	`\cov[X]`
$\mathrm{cov}[X, Y]$	covariance of X and Y	`\cov[X][Y]`
corr	correlation operator	`\corr`
$\mathrm{corr}[X, X]$	correlation of X	`\corr[X]`
$\mathrm{corr}[X, Y]$	correlation of X and Y	`\corr[X][Y]`
var	variance operator	`\var`
$\mathrm{var}[X]$	variance of X	`\var[X]`
sd	standard deviation operator	`\sd`
$\mathrm{sd}[X]$	standard deviation of X	`\sd[X]`
$\mathbb{P}$	probability measure	`\Prob`
$\mathbb{P}(A)$	probability measure of event A	`\Prob[A]`
$\mathbb{P}_X$	probability measure of X	`\Prob[][X]`

$\mathbb{P}_X(A)$	probability measure of X for event A	`\Prob[A][X]`
$\mathbb{E}$	expectation operator	`\Exp`
$\mathbb{E}[X]$	expectation of X	`\Exp[X]`
$\mathbb{E}_F$	expectation with respect to F	`\Exp[][F]`
$\mathbb{E}_F[X]$	expectation of X with respect to F	`\Exp[X][F]`
med	median operator	`\median`
$\mathrm{med}[X]$	median of X	`\median[X]`

Symbols in option *bold*

Bold symbols for the Latin and Greek alphabet. Bold symbols basically follow the pattern `\b+LETTER`. However, for some symbols this pattern leads to already reserved keywords. For bold f, m and η we therefore have `\bbf`, `\bbm` and `\bfeta`.

Symbol	**Name**	**Definition**
$\boldsymbol{A}$	bold A	`\bA`
$\boldsymbol{B}$	bold B	`\bB`
$\boldsymbol{C}$	bold C	`\bC`
$\boldsymbol{D}$	bold D	`\bD`
$\boldsymbol{E}$	bold E	`\bE`
$\boldsymbol{F}$	bold F	`\bF`
$\boldsymbol{G}$	bold G	`\bG`
$\boldsymbol{H}$	bold H	`\bH`
$\boldsymbol{I}$	bold I	`\bI`
$\boldsymbol{J}$	bold J	`\bJ`
$\boldsymbol{K}$	bold K	`\bK`
$\boldsymbol{L}$	bold L	`\bL`
$\boldsymbol{M}$	bold M	`\bM`
$\boldsymbol{N}$	bold N	`\bN`
$\boldsymbol{O}$	bold O	`\bO`
$\boldsymbol{P}$	bold P	`\bP`
$\boldsymbol{Q}$	bold Q	`\bQ`
$\boldsymbol{R}$	bold R	`\bR`
$\boldsymbol{S}$	bold S	`\bS`
$\boldsymbol{T}$	bold T	`\bT`
$\boldsymbol{U}$	bold U	`\bU`
$\boldsymbol{V}$	bold V	`\bV`
$\boldsymbol{W}$	bold W	`\bW`
$\boldsymbol{X}$	bold X	`\bX`
$\boldsymbol{Y}$	bold Y	`\bY`
$\boldsymbol{Z}$	bold Z	`\bZ`
$\boldsymbol{a}$	bold a	`\ba`
$\boldsymbol{b}$	bold b	`\bb`
$\boldsymbol{c}$	bold c	`\bc`
$\boldsymbol{d}$	bold d	`\bd`

$\boldsymbol{e}$	bold e	`\be`
$\boldsymbol{f}$	bold f	`\bbf`
$\boldsymbol{g}$	bold g	`\bg`
$\boldsymbol{h}$	bold h	`\bh`
$\boldsymbol{i}$	bold i	`\bi`
$\boldsymbol{j}$	bold j	`\bj`
$\boldsymbol{k}$	bold k	`\bk`
$\boldsymbol{l}$	bold l	`\bl`
$\boldsymbol{m}$	bold m	`\bbm`
$\boldsymbol{n}$	bold n	`\bn`
$\boldsymbol{o}$	bold o	`\bo`
$\boldsymbol{p}$	bold p	`\bp`
$\boldsymbol{q}$	bold q	`\bq`
$\boldsymbol{r}$	bold r	`\br`
$\boldsymbol{s}$	bold s	`\bs`
$\boldsymbol{t}$	bold t	`\bt`
$\boldsymbol{u}$	bold u	`\bu`
$\boldsymbol{v}$	bold v	`\bv`
$\boldsymbol{w}$	bold w	`\bw`
$\boldsymbol{x}$	bold x	`\bx`
$\boldsymbol{y}$	bold y	`\by`
$\boldsymbol{z}$	bold z	`\bz`
$\boldsymbol{\alpha}$	bold alpha	`\balpha`
$\boldsymbol{\beta}$	bold beta	`\bbeta`
$\boldsymbol{\gamma}$	bold gamma	`\bgamma`
$\boldsymbol{\Gamma}$	bold Gamma	`\bGamma`
$\boldsymbol{\delta}$	bold delta	`\bdelta`
$\boldsymbol{\Delta}$	bold Delta	`\bDelta`
$\boldsymbol{\epsilon}$	bold epsilon	`\bepsilon`
$\boldsymbol{\varepsilon}$	bold varepsilon	`\bvarepsilon`
$\boldsymbol{\zeta}$	bold zeta	`\bzeta`
$\boldsymbol{\eta}$	bold eta	`\bfeta`
$\boldsymbol{\theta}$	bold theta	`\btheta`
$\boldsymbol{\vartheta}$	bold vartheta	`\bvartheta`
$\boldsymbol{\Theta}$	bold Theta	`\bTheta`
$\boldsymbol{\iota}$	bold iota	`\biota`
$\boldsymbol{\kappa}$	bold kappa	`\bkappa`
$\boldsymbol{\lambda}$	bold lambda	`\blambda`
$\boldsymbol{\Lambda}$	bold Lambda	`\bLambda`
$\boldsymbol{\mu}$	bold mu	`\bmu`
$\boldsymbol{\nu}$	bold nu	`\bnu`
$\boldsymbol{\xi}$	bold xi	`\bxi`
$\boldsymbol{\Xi}$	bold Xi	`\bXi`
$\boldsymbol{\pi}$	bold pi	`\bpi`
$\boldsymbol{\Pi}$	bold pi	`\bPi`
$\boldsymbol{\rho}$	bold rho	`\brho`

$\boldsymbol{\varrho}$	bold varrho	`\bvarrho`
$\boldsymbol{\sigma}$	bold sigma	`\bsigma`
$\boldsymbol{\Sigma}$	bold Sigma	`\bSigma`
$\boldsymbol{\tau}$	bold tau	`\btau`
$\boldsymbol{\upsilon}$	bold upsilon	`\bupsilon`
$\boldsymbol{\Upsilon}$	bold Upsilon	`\bUpsilon`
$\boldsymbol{\phi}$	bold phi	`\bphi`
$\boldsymbol{\varphi}$	bold varphi	`\bvarphi`
$\boldsymbol{\Phi}$	bold Phi	`\bPhi`
$\boldsymbol{\chi}$	bold chi	`\bchi`
$\boldsymbol{\psi}$	bold psi	`\bpsi`
$\boldsymbol{\Psi}$	bold Psi	`\bPsi`
$\boldsymbol{\omega}$	bold omega	`\bomega`
$\boldsymbol{\Omega}$	bold Omega	`\bOmega`

Symbols in option *cal*

Calligraphic letter for the Latin alphabet. Calligraphic symbols follow the pattern `\cal+LETTER`.

Symbol	**Name**	**Definition**
$\mathcal{A}$	calligraphy A	`\calA`
$\mathcal{B}$	calligraphy B	`\calB`
$\mathcal{C}$	calligraphy C	`\calC`
$\mathcal{D}$	calligraphy D	`\calD`
$\mathcal{E}$	calligraphy E	`\calE`
$\mathcal{F}$	calligraphy F	`\calF`
$\mathcal{G}$	calligraphy G	`\calG`
$\mathcal{H}$	calligraphy H	`\calH`
$\mathcal{I}$	calligraphy I	`\calI`
$\mathcal{J}$	calligraphy J	`\calJ`
$\mathcal{K}$	calligraphy K	`\calK`
$\mathcal{L}$	calligraphy L	`\calL`
$\mathcal{M}$	calligraphy M	`\calM`
$\mathcal{N}$	calligraphy N	`\calN`
$\mathcal{O}$	calligraphy O	`\calO`
$\mathcal{P}$	calligraphy P	`\calP`
$\mathcal{Q}$	calligraphy Q	`\calQ`
$\mathcal{R}$	calligraphy R	`\calR`
$\mathcal{S}$	calligraphy S	`\calS`
$\mathcal{T}$	calligraphy T	`\calT`
$\mathcal{U}$	calligraphy U	`\calU`
$\mathcal{V}$	calligraphy V	`\calV`
$\mathcal{W}$	calligraphy W	`\calW`
$\mathcal{X}$	calligraphy X	`\calX`
$\mathcal{Y}$	calligraphy Y	`\calY`

$\mathcal{Z}$	calligraphy Z	`\calZ`
$\mathcal{a}$	calligraphy a	`\cala`
$\mathcal{b}$	calligraphy b	`\calb`
$\mathcal{c}$	calligraphy c	`\calc`
$\mathcal{d}$	calligraphy d	`\cald`
$\mathcal{e}$	calligraphy e	`\cale`
$\mathcal{f}$	calligraphy f	`\calf`
$\mathcal{g}$	calligraphy g	`\calg`
$\mathcal{h}$	calligraphy h	`\calh`
$\mathcal{i}$	calligraphy i	`\cali`
$\mathcal{j}$	calligraphy j	`\calj`
$\mathcal{k}$	calligraphy k	`\calk`
$\mathcal{l}$	calligraphy l	`\call`
$\mathcal{m}$	calligraphy m	`\calm`
$\mathcal{n}$	calligraphy n	`\caln`
$\mathcal{o}$	calligraphy o	`\calo`
$\mathcal{p}$	calligraphy p	`\calp`
$\mathcal{q}$	calligraphy q	`\calq`
$\mathcal{r}$	calligraphy r	`\calr`
$\mathcal{s}$	calligraphy s	`\cals`
$\mathcal{t}$	calligraphy t	`\calt`
$\mathcal{u}$	calligraphy u	`\calu`
$\mathcal{v}$	calligraphy v	`\calv`
$\mathcal{w}$	calligraphy w	`\calw`
$\mathcal{x}$	calligraphy x	`\calx`
$\mathcal{y}$	calligraphy y	`\caly`
$\mathcal{z}$	calligraphy z	`\calz`

Symbols in option *laws*

Symbols for probability laws follow a **R** type syntax `\l+NAME`.

Symbol	Name	Definition
Unif	law of the uniform distribution	`\lunif`
$\mathcal{N}$	law of the normal distribution	`\lnorm`
Pois	law of the Poisson distribution	`\lpois`
Binom	law of the binomial distribution	`\lbin`
Exp	law of the exponential distribution	`\lexp`
Ber	law of the Bernoulli distribution	`\lber`
t	law of the student t distribution	`\lt`
Gamma	law of the gamma distribution	`\lgamma`
Beta	law of the beta distribution	`\lbeta`
Cauchy	law of the Cauchy distribution	`\lcauchy`
Geom	law of the geometric distribution	`\lgeom`
χ^2	law of the chi-square distribution	`\lchisq`