Notation

Some specific sets

$\mathbf{R}$	Real numbers.
$\mathbf{R}^n$	Real n-vectors ($n \times 1$ matrices).
$\mathbf{R}^{m\times n}$	Real $m \times n$ matrices.
$\mathbf{R}_+$, $\mathbf{R}_{++}$	Nonnegative, positive real numbers.
$\mathbf{C}$	Complex numbers.
$\mathbf{C}^n$	Complex n-vectors.
$\mathbf{C}^{m\times n}$	Complex $m \times n$ matrices.
$\mathbf{Z}$	Integers.
$\mathbf{Z}_+$	Nonnegative integers.
$\mathbf{S}^n$	Symmetric $n \times n$ matrices.
$\mathbf{S}^n_+$, $\mathbf{S}^n_{++}$	Symmetric positive semidefinite, positive definite, $n \times n$ matrices.

Vectors and matrices

$\mathbf{1}$	Vector with all components one.
e_i	ith standard basis vector.
I	Identity matrix.
X^T	Transpose of matrix X.
X^H	Hermitian (complex conjugate) transpose of matrix X.
$\mathbf{tr}\, X$	Trace of matrix X.
$\lambda_i(X)$	ith largest eigenvalue of symmetric matrix X.
$\lambda_{\max}(X)$, $\lambda_{\min}(X)$	Maximum, minimum eigenvalue of symmetric matrix X.
$\sigma_i(X)$	ith largest singular value of matrix X.
$\sigma_{\max}(X)$, $\sigma_{\min}(X)$	Maximum, minimum singular value of matrix X.
$X^\dagger$	Moore-Penrose or pseudo-inverse of matrix X.
$x \perp y$	Vectors x and y are orthogonal: $x^T y = 0$.
$V^\perp$	Orthogonal complement of subspace V.
$\mathbf{diag}(x)$	Diagonal matrix with diagonal entries $x_1, \ldots, x_n$.
$\mathbf{diag}(X, Y, \ldots)$	Block diagonal matrix with diagonal blocks $X, Y, \ldots$.
$\mathbf{rank}\, A$	Rank of matrix A.
$\mathcal{R}(A)$	Range of matrix A.
$\mathcal{N}(A)$	Nullspace of matrix A.

Norms and distances

$\|\cdot\|$	A norm.
$\|\cdot\|_*$	Dual of norm $\|\cdot\|$.
$\|x\|_2$	Euclidean (or ℓ_2-) norm of vector x.
$\|x\|_1$	ℓ_1-norm of vector x.
$\|x\|_\infty$	ℓ_∞-norm of vector x.
$\|X\|_2$	Spectral norm (maximum singular value) of matrix X.
$B(c, r)$	Ball with center c and radius r.
$\mathbf{dist}(A, B)$	Distance between sets (or points) A and B.

Generalized inequalities

$x \preceq y$	Componentwise inequality between vectors x and y.
$x \prec y$	Strict componentwise inequality between vectors x and y
$X \preceq Y$	Matrix inequality between symmetric matrices X and Y.
$X \prec Y$	Strict matrix inequality between symmetric matrices X and Y.
$x \preceq_K y$	Generalized inequality induced by proper cone K.
$x \prec_K y$	Strict generalized inequality induced by proper cone K.
$x \preceq_{K^*} y$	Dual generalized inequality.
$x \prec_{K^*} y$	Dual strict generalized inequality.

Topology and convex analysis

$\mathbf{card}\, C$	Cardinality of set C.
$\mathbf{int}\, C$	Interior of set C.
$\mathbf{relint}\, C$	Relative interior of set C.
$\mathbf{cl}\, C$	Closure of set C.
$\mathbf{bd}\, C$	Boundary of set C: $\mathbf{bd}\, C = \mathbf{cl}\, C \setminus \mathbf{int}\, C$.
$\mathbf{conv}\, C$	Convex hull of set C.
$\mathbf{aff}\, C$	Affine hull of set C.
K^*	Dual cone associated with K.
I_C	Indicator function of set C.
S_C	Support function of set C.
f^*	Conjugate function of f.

Probability

$\mathbf{E}\, X$	Expected value of random vector X.
$\mathbf{prob}\, S$	Probability of event S.
$\mathbf{var}\, X$	Variance of scalar random variable X.
$\mathcal{N}(c, \Sigma)$	Gaussian distribution with mean c, covariance (matrix) Σ.
Φ	Cumulative distribution function of $\mathcal{N}(0, 1)$ random variable.

Functions and derivatives

$f : A \to B$	f is a function on the set $\mathbf{dom}\, f \subseteq A$ into the set B.
$\mathbf{dom}\, f$	Domain of function f.
$\mathbf{epi}\, f$	Epigraph of function f.
∇f	Gradient of function f.
$\nabla^2 f$	Hessian of function f.
Df	Derivative (Jacobian) matrix of function f.