

List of Symbols

Symbol	Page	Meaning
$L^p(\Omega)$	p. 1	space of measurable functions with finite L^p -norm
$f \sim g$	p. 1	$f(\omega) = g(\omega)$ for μ -a.a. $\omega \in \Omega$
$L^p(\Omega)$	p. 1	$L^p(\Omega) = \mathcal{L}^p(\Omega)/\sim$
$\ f\ _p$	p. 1	$\ f\ _p = \left(\int_{\Omega} f(\omega) ^p d\mu \right)^{\frac{1}{p}}$
$\mathcal{L}^\infty(\Omega)$	p. 1	set of measurable functions $f: \Omega \rightarrow \mathbb{R}$ for which there exists $M > 0$ such that $\mu(\{\omega \in \Omega : f(\omega) > M\}) = 0$
$L^\infty(\Omega)$	p. 1	$L^\infty(\Omega) = \mathcal{L}^\infty(\Omega)/\sim$
$\ f\ _\infty$	p. 1	$\ f\ _\infty = \inf \{M > 0 : \mu(\{\omega \in \Omega : f(\omega) > M\}) > 0\}$
$C_b(X)$	p. 2	space of all bounded continuous functions $f: X \rightarrow \mathbb{R}$
$L^p_{\text{loc}}(\Omega)$	p. 2	space of functions $f: \Omega \rightarrow \mathbb{R} \cup \{\pm\infty\}$ such that $f \in L^p(K)$ for every compact set $K \subseteq \Omega$
$u_n \xrightarrow{\mu} u$	p. 3	convergence in μ -measure
$u_n \xrightarrow{au} u$	p. 3	convergence almost uniform
$L^0(\Omega)$	p. 4	space of all equivalence classes of measurable functions
$M(u)(x)$	p. 7	$M(u)(x) = \sup_{r>0} \frac{1}{\lambda^N(B_r(x))} \int_{B_r(x)} u(z) dz$
$M_r(u)(x)$	p. 7	$M_r(u)(x) = \sup_{0<r<R} \frac{1}{\lambda^N(B_r(x))} \int_{B_r(x)} u(z) dz$
$L \log L(A)$	p. 8	space of measurable functions $u: A \rightarrow \mathbb{R}$ such that $\int_A u(z) \log(2 + u(z)) dz < +\infty$
$\int_A u d\mu$	p. 9	Bochner integral of u over A

$L^p(\Omega; X)$	p. 10	space of all equivalence classes of the strongly measurable functions $u: \Omega \rightarrow X$ such that $\ u(\cdot)\ _X \in L^p(\Omega)$
$\ u\ _p$	p. 10	norm in $L^p(\Omega; X)$
$\ u\ _\infty$	p. 10	norm in $L^\infty(\Omega; X)$
$ m $	p. 10	variation of vector measure m
$\ u\ _{L^\infty(\Omega; X_{w^*}^*)}$	p. 12	norm on $L^\infty(\Omega; X_{w^*}^*)$
$\text{disc } u$	p. 12	set of discontinuity points of u
$\text{Var } u$	p. 13	total variation of function $u: I \rightarrow \mathbb{R}$
$BV(I)$	p. 13	space of functions of bounded variation
$AC(I)$	p. 16	space of absolutely continuous functions on I
$AC_{\text{loc}}(I)$	p. 16	space of functions absolutely continuous on every $[a, b] \subseteq I$
$BV(\Omega)$	p. 17	space of functions of bounded variation
$D_k u$	p. 17	distributional (or weak) k -partial derivative
$U \subset\subset \Omega$	p. 17	\bar{U} is compact and $\bar{U} \subseteq \Omega$
$BV_{\text{loc}}(\Omega)$	p. 17	$BV_{\text{loc}}(\Omega) = \{u \in L^1_{\text{loc}}(\Omega) : u \in BV(U), U \subset\subset \Omega\}$
$M_b(\Omega; \mathbb{R}^N)$	p. 17	space of Radon measures
$ Du (A)$	p. 17	total variation of measure Du
$\text{Var } u$	p. 18	variation of u
$\text{Var}(u; \Omega)$	p. 18	variation of u in Ω
$P(E; \Omega)$	p. 18	perimeter of A in Ω
$C_c(X)$	p. 20	space of continuous functions of compact support
$C_0(X)$	p. 20	space of continuous functions and vanishing at infinity
$M_b(X)$	p. 21	space of signed Radon measures X
$\ \mu\ _{M_b(X)}$	p. 21	total variation norm
$\mu_n \xrightarrow{w} \mu$	p. 22	weak convergence
$\mu_n \xrightarrow{n} \mu$	p. 22	narrow convergence
$M_b^+(X)$	p. 23	subset of $M_b(X)$ consisting of (positive) Radon measures
$M_b^f(X)$	p. 23	subset of $M_b(X)$ consisting of finite linear combinations of Dirac measures
$M_1^+(X)$	p. 23	set of probability measures on X

$\mathcal{U}_d(X)$	p. 23	space of uniformly continuous functions for compatible metric d_x on X
$W^{1,p}(a, b)$	p. 24	Sobolev space
$W_0^{1,p}(a, b)$	p. 25	Sobolev space
$W^{1,p}(a, b) \hookrightarrow L^\infty(I)$	p. 26	$W^{1,p}(a, b)$ is embedded continuously into $L^\infty(I)$
$W^{1,p}(a, b) \xrightarrow{c} C(\bar{I})$	p. 26	$W^{1,p}(a, b)$ is embedded compactly in $C(\bar{I})$
$W^{m,p}(a, b)$	p. 27	Sobolev space
$W^{1,p}(\Omega)$	p. 27	Sobolev space
$\frac{\partial u}{\partial z_k}$	p. 27	weak partial derivative of u
$H^1(\Omega)$	p. 27	Sobolev space
$W_0^{1,p}(\Omega)$	p. 30	Sobolev space
γ	p. 31	trace operator
$C^{0,\alpha}(\bar{\Omega})$	p. 32	space of Hölder continuous functions
$W^{m,p}(\Omega)$	p. 32	Sobolev space
$C^{k,\alpha}$	p. 33	space of function $u \in C^k(\Omega)$ such that $D^j u \in C^{0,\alpha}(\bar{\Omega})$ for all multiindex j with $ j \leq k$
$W^{-1,p'}(\Omega)$	p. 33	dual of $W_0^{1,p}(\Omega)$
$W_{pq}(0, b)$	p. 51	space of functions $u \in L^p(T; X_1)$ such that $u' \in L^q(T; X_2)$
$u_n \xrightarrow{w^*} u$	p. 53	w^* -convergence in $BV(\Omega)$
\bar{u}	p. 55	average of u
$W_{\text{loc}}^{1,p}(\Omega)$	p. 58	space of functions $u \in L_{\text{loc}}^1(\Omega)$ such that $u \in W^{1,p}(\Omega_0)$ for all open $\Omega_0 \subset\subset \Omega$
$J_\eta(x)$	p. 59	Jacobian of η at x
$\text{cap}_p(U, \Omega)$	p. 61	p -capacity of U with respect to Ω
$K(D; Y)$	p. 217	set of all compact maps $f: D \rightarrow Y$
$\mathcal{L}_c(X; Y)$	p. 217	$\mathcal{L}(X; Y) \cap K(X; Y)$
$K_f(D; Y)$	p. 217	set of all finite rank maps $f: D \rightarrow Y$
$\mathcal{L}_f(X; Y)$	p. 217	$\mathcal{L}(X; Y) \cap K_f(X; Y)$
$K_{wc}(D; Y)$	p. 217	set of weakly compact maps $f: D \rightarrow Y$
$\mathcal{L}_{wc}(X; Y)$	p. 217	$\mathcal{L}(X; Y) \cap K_{wc}(X; Y)$
$\sigma(A)$	p. 220	spectrum of A

$\varrho(A)$	p. 220	resolvent set of A
$R(\lambda)$	p. 220	resolvent of A
$\sigma_p(A)$	p. 220	point spectrum of A
$i(A)$	p. 222	index of operator A
$\text{Fred}(X; Y)$	p. 222	set of Fredholm operators $L: X \rightarrow Y$
$SC_k(D; Y)$	p. 223	family of k -set contractions f
$S(D; Y)$	p. 223	family of condensing maps $f: D \rightarrow Y$
$P_f(X)$	p. 224	family of nonempty and closed subsets of X
$P_k(X)$	p. 224	family of nonempty and compact subsets of X
$\widehat{P}_f(X)$	p. 224	$P_f(X) \cup \{\emptyset\}$
$P_{fc}(X)$	p. 224	$P_{fc}(X) = \{A \in P_f(X) : A \text{ is convex}\}$
$P_{kc}(X)$	p. 224	$P_{kc}(X) = \{A \in P_k(X) : A \text{ is convex}\}$
$P_{wkc}(X)$	p. 224	$P_{wkc}(X) = \{A \subseteq X : A \text{ is nonempty, } w\text{-compact and convex}\}$
$P_{bf(c)}(X)$	p. 224	$P_{bf(c)}(X) = \{A \subseteq X : A \text{ is nonempty, bounded, closed (and convex)}\}$
$F^-(D)$	p. 224	weak inverse image of D under F
$F^+(D)$	p. 224	strong inverse image of D under F
$\{x_\alpha\}_{\alpha \in J}$	p. 225	net
$\text{Gr } F$	p. 226	graph of a multifunction F
$h^*(C, D)$	p. 227	excess of C over D
$h(C, D)$	p. 227	Hausdorff distance of C from D
$L^0(\Omega; X)$	p. 233	space of measurable functions $u: \Omega \rightarrow X$
$\ \cdot\ _w$	p. 234	weak norm on $L^1(T; X)$
CS_{Γ}^w	p. 235	set of continuous selectors
$A_n \xrightarrow{h} A$	p. 236	convergence in Hausdorff sense
$h\text{-}\lim_{n \rightarrow +\infty} A_n = A$	p. 236	convergence in Hausdorff sense
$\tau\text{-}\liminf_{n \rightarrow +\infty} A_n$	p. 236	τ -Kuratowski limit inferior
$\tau\text{-}\limsup_{n \rightarrow +\infty} A_n$	p. 236	τ -Kuratowski limit superior
$\tau\text{-}\lim_{n \rightarrow +\infty} A_n$	p. 236	τ -Kuratowski limit

$A_n \xrightarrow{K_\tau} A$	p. 236	τ -Kuratowski limit
$A_n \xrightarrow{M} A$	p. 237	convergence of sets in Mosco sense
$A_n \xrightarrow{w} A$	p. 237	weak (or scalar) convergence
$D(A)$	p. 238	domain of multifunction A
$\text{Gr } A$	p. 238	graph of multifunction A
A^{-1}	p. 242	inverse map
J_λ^A	p. 243	resolvent of A
A_λ	p. 243	Yosida approximation of A
A^0	p. 247	minimal section of A
$\{S(t)\}_{t \geq 0}$	p. 248	semigroup
proj_K	p. 263	metric projection on K
J_λ	p. 274	resolvent of A
A_λ	p. 274	Yosida approximation of A
A^0	p. 274	minimal section of A
$L^2_{2\pi}(\mathbb{R})$	p. 282	space of 2π -period $L^2(\mathbb{R})$ -functions
Δ_2	p. 334	diagonal set
$m(X^*, X)$	p. 360	Mackey topology on X^*
$\varphi'_G(u)$	p. 409	Gâteaux derivative of φ at u
$\varphi'(u)$	p. 409	Fréchet derivative of φ at u
$C^1(U)$	p. 410	class of functions with continuous Gâteaux derivative
$(\varphi'_{u_1})_G(\hat{u}_1, \hat{u}_2)$	p. 411	partial Gâteaux derivative
$\varphi'_{u_1}(\hat{u}_1, \hat{u}_2)$	p. 411	partial Fréchet derivative
$J\varphi(u)$	p. 412	Jacobian matrix of φ
$\mathcal{L}(X_1, \dots, X_n; Y)$	p. 416	family of continuous multilinear maps
$\mathcal{L}_s(X^n; Y)$	p. 417	family of symmetric n -linear map
$\varphi^{(n)}$	p. 417	n -th derivative of φ
$H\varphi(u_0)$	p. 417	Hession matrix of φ at u_0
$\tilde{\sigma}(\cdot, t_0, u_0)$	p. 419	maximal integral curve through (t_0, u_0)
$\overline{\mathbb{R}}$	p. 420	$\overline{\mathbb{R}} = \mathbb{R} \cup \{+\infty\}$
$\text{dom } \varphi$	p. 420	effective domain of φ
$\text{epi } \varphi$	p. 420	epigraph of φ

i_C	p. 420	indicator function of C
$\Gamma_0(X)$	p. 421	cone of proper, lower semicontinuous, and convex functions
$\text{cl } \varphi$	p. 421	closure of φ
$\overline{\text{conv}} \varphi$	p. 421	convex closure of φ
$\text{core } C$	p. 422	core of C
$\varphi'(u; h)$	p. 422	directional derivative of φ at u in direction h
$\partial\varphi(u_0)$	p. 423	subdifferential of φ at u_0
φ^*	p. 425	conjugate of φ
φ^{**}	p. 425	second conjugate of φ
$\varphi \boxminus \psi$	p. 426	infimal convolution
$\partial_\varepsilon\varphi$	p. 428	ε -subdifferential of φ
$T_C(u)$	p. 431	tangent cone to C at u
$N_C(u)$	p. 431	normal cone to C at u
$\varphi^0(u; h)$	p. 433	generalized directional derivative of φ at u in direction h
$\partial\varphi(u)$	p. 434	generalized (Clarke) subdifferential
$\text{dist}(\cdot, C)$	p. 435	distance function from C
$T'_C(u)$	p. 436	Clarke tangent cone to C at u
$N'_C(u)$	p. 436	Clarke normal cone to C at u
$T^b_C(u)$	p. 436	contingent (or Bouligand) tangent cone to C at u
$\varphi_n \xrightarrow{\Gamma} \varphi$	p. 437	Γ -convergence
$(\Gamma\text{-}\liminf_{n \rightarrow +\infty} \varphi_n)(u)$	p. 437	Γ -limit inferior
$(\Gamma\text{-}\limsup_{n \rightarrow +\infty} \varphi_n)(u)$	p. 437	Γ -limit superior
$C_n \xrightarrow{M} C$	p. 440	convergence of sets in Mosco sense
$\varphi_n \xrightarrow{M} \varphi$	p. 440	convergence of functions in Mosco sense
$M_b(T)_+$	p. 442	Radon measures on T
$M^1_+(T)$	p. 442	probability measures on T
$SM^1_+(T)$	p. 442	subprobability measures on T
$\widehat{R}(\Omega; T)$	p. 442	space of transition probabilities

$\widehat{SR}(\Omega; T)$	p. 442	space of transition subprobabilities
w_n	p. 443	narrow topology
$\lambda \circ \vartheta^{-1}$	p. 443	image measure of λ under ϑ
$\mathcal{Y}(\Omega, T; \mu)$	p. 443	space of Young measures with respect to μ
$S\mathcal{Y}(\Omega, T; \mu)$	p. 443	space of Young submeasures with respect to μ
$R(\Omega; T)$	p. 444	$R(\Omega; T) = \widehat{R}(\Omega; T)/\sim$
$SR(\Omega; T)$	p. 444	$R(\Omega; T) = \widehat{SR}(\Omega; ST)/\sim$
$\xi_n \xrightarrow{n} \xi$	p. 445	narrow convergence
$M_n(\mathbb{R})$	p. 451	space of all $n \times n$ -real matrices
$\text{End}_n(\mathbb{R})$	p. 451	set of all invertible elements of $M_n(\mathbb{R})$
K^0	p. 457	polar of K
$CU_b(T)$	p. 477	space of uniformly continuous and bounded functions on T
$J_\varphi(u_0)$	p. 617	Jacobian of φ at u_0
S_φ	p. 617	critical set of φ
$\varphi(S_\varphi)$	p. 617	crease of φ
$d(\varphi, \Omega, h)$	p. 618	degree of φ at h with respect to Ω
sgn	p. 618	sign function
$d(\varphi, \Omega, h)$	p. 619	degree of φ at h with respect to Ω
$d(\varphi, \Omega, h)$	p. 619	degree of φ at h with respect to Ω
$i_\infty(\varphi, h)$	p. 620	index of φ at infinity
$d_1(\psi)$	p. 621	Brouwer degree of ψ
$d_{LS}(\varphi, \Omega, h)$	p. 624	Leray–Schauder degree
$d_{SC}(I_X - f, \Omega, 0)$	p. 627	degree of $SC_k(\overline{\Omega}; X)$ -function
$d_C(I_X - f, \Omega, 0)$	p. 628	degree of $S(\overline{\Omega}; X)$ -function
$\mathcal{Y}_{(S_+)}$	p. 630	family of demicontinuous, $(S)_+$ -maps
$d_{(S)_+}$	p. 630	degree of $\mathcal{Y}_{(S)_+}$ -maps
\mathcal{Y}_M	p. 632	family of admissible triples to define degree d_M
d_M	p. 632	degree on \mathcal{Y}_M
\mathcal{Y}_{SV}	p. 634	family of admissible triples to define degree d_{SV}
d_{SV}	p. 634	degree of \mathcal{Y}_{SV} -maps

$\text{rint } C$	p. 640	relative interior of C with respect to $\text{span } C$
$ \varphi _\infty$	p. 642	quasinorm of φ
$\varphi'(\infty)$	p. 643	asymptotic derivative of φ
$\varphi \simeq \psi$	p. 646	φ and ψ are homotopic
$\varphi \simeq \psi$ in $K(X; Y)$	p. 646	φ and ψ are compactly homotopic
$\varphi \simeq 0$	p. 646	φ is null-homotopic
$\varphi \simeq 0$ in $K(X; Y)$	p. 646	φ is compactly null-homotopic
\preceq	p. 646	partial order relation
$u \prec v$	p. 647	$u \preceq v$ and $u \neq v$
$\sup C$	p. 647	supremum of C
$\inf C$	p. 647	infimum of C
$[u, v]$	p. 647	order interval
$u \leq v$	p. 648	$v - u \in K$ (in order cone K)
$u \ll v$	p. 648	$v - u \in \text{int } K$ (in solid order cone K)
K^*	p. 649	dual cone
$i: \mathcal{Y}_i \rightarrow \mathbb{Z}$	p. 651	fixed point index of φ over Ω with respect to K
$\mathcal{N}(u)$	p. 805	filter of open neighborhoods of u
L_λ	p. 806	sublevel set
τ_{seq}	p. 806	topology on X , for which closed sets are sequentially τ -closed sets
$[\sigma]_u$	p. 809	equivalence class of curves tangent to σ at u
$T_u M$	p. 809	tangent space of M at u
TM	p. 809	tangent bundle of M
τ_M	p. 809	tangent bundle projection
K_φ	p. 816	critical set of φ
K_φ^c	p. 816	critical set of φ at the level c
φ^c	p. 816	sublevel of φ at c
φ_a	p. 816	superlevel of φ at a
$l(\sigma)$	p. 822	geodesic length
$\delta(u_1, u_2)$	p. 822	geodesic distance
K_φ	p. 824	$\{u \in X : 0 \in \partial\varphi(u)\}$ (critical set of φ)

K_φ^c	p. 824	$\{u \in K_\varphi : \varphi(u) = c\}$
K_Φ	p. 824	$\{u \in X : -\varphi'(u) \in \partial\psi(u)\}$ (critical set of $\Phi = \varphi + \psi$)
$\{L(g)\}_{g \in G}$	p. 827	representation of G over X
$\text{Fix}_G(X)$	p. 827	set of invariant (or fixed) points
\mathcal{Y}	p. 827	$\{D \subseteq X : D \text{ is closed and } G\text{-invariant}\}$
\mathcal{Y}_k	p. 828	$\{D \subseteq X : D \text{ is compact, invariant and } i(D) \geq k\}$
$\gamma(D)$	p. 828	Krasnoselskii genus of D
$\text{cat}_Y(D)$	p. 829	Ljusternik–Schnirelmann category of D in Y
$\sigma_0(p)$	p. 839	set of eigenvalues of $(-\Delta_p, W_0^{1,p}(\Omega))$
$K_\varphi[a, b]$	p. 878	$\{u \in K_\varphi : a \leq \varphi(u) \leq b\}$
$\sigma(2)$	p. 880	set of eigenvalues of $(-\Delta, H_0^1(\Omega))$

Index

Symbols

- (A_∞) -condition, 834
 - (A_∞^+) -condition, 834
 - (A_∞^-) -condition, 834
 - $(S)_+$
 - homotopy, 631
 - map, 245
 - (m, n) -linking, 835
 - C^1 map, 410
 - C^k -Banach manifold, 808
 - C^k -diffeomorphism, 418
 - C^k -vector field, 418
 - C_0 -semigroup, 248
 - G -index, 828
 - G -invariant set, 827
 - L^p -integrably bounded multifunction, 234
 - PS^* -condition, 826
 - PS_c^* -condition, 826
 - Γ -converges, 437
 - α -homogeneous map, 451
 - ε -subdifferential, 428
 - inf-compact function, 446
 - μ -essentially separably valued function, 9
 - τ -inf-compact function, 806
 - τ -Kuratowski limit, 236
 - inferior, 236
 - superior, 236
 - τ -coercive function, 806
 - τ -lower semicontinuous function, 805
 - ε -chain, 668
 - ε -chainable metric, 668
 - a -lsc, 261
 - h -Carathéodory multifunction, 235
 - h -continuous multifunction, 229
 - h -lower semicontinuous multifunction, 229
 - h -lsc, 229
 - h -point, 620
 - h -upper semicontinuous multifunction, 229
 - h -usc, 229
 - k -contraction, 635
 - multivalued, 668
 - k -set contraction map, 223
 - k -set-Lipschitz map, 223
 - m -accretive map, 246
 - m -dissipative map, 246
 - n -linear map, 416
 - p -capacity, 61
 - w^* -convergence in $BV(\Omega)$, 53
 - w^* -measurable function, 8
 - w^* -normal structure, 638
- ## A
- absolute
 - continuity, 5
 - neighbourhood retract, 650
 - retract, 650
 - absolutely continuous function, 16
 - absorbing
 - point, 240
 - set, 422
 - accretive map, 246
 - action
 - admissible, 830

- admissible
 - action, 830
 - sequence of multiindices, 825
- algebraic
 - interior, 422
 - multiplicity, 625
- almost
 - lower semicontinuous, 261
 - uniform convergence, 3
- alternative
 - Fredholm, 221
 - theorem, 642
- angelic space, 643
- ANR, 650
- antisymmetry, 646
- AP property, 219
- approximation
 - Moreau–Yosida, 459
 - property, 219
 - Yosida, 274
- AR, 650
- Arens–Eells theorem, 653
- Asplund
 - space, 425
 - weak space, 425
- asymptotic derivative, 643
- asymptotically linear map, 643
- Aumann integral, 235
- average, 55

- B**
- Banach
 - fixed point theorem, 635
 - indicatrix, 15
 - manifold, 808
 - ordered space, 648
- barycenter, 478
- Birkhoff–Kellogg theorem, 642
- Bochner
 - integrable function, 9
 - integral, 9
- Borsuk
 - fixed point theorem, 640
 - theorem, 621
- Borsuk–Ulam theorem, 622
- Borwein–Preiss smooth variational
 - principle, 942
- Bouligand tangent cone, 436
- boundary condition, 640
- bounded
 - above set, 647
 - below set, 647
 - map, 240
 - variation, 10, 13, 17
- boundedly
 - w -compact set, 263
 - compact set, 263
- boundedness
 - in direction, 63
- Bourbaki–Kneser
 - fixed point theorem, 648
- Brouwer
 - degree, 619, 621
 - fixed point theorem, 639
- bundle
 - tangent, 809
- BV-function, 13, 17

- C**
- C_c -condition, 815
- C-condition, 815
- capacity, 61
- Carathéodory
 - function, 34
 - map, 264
 - multifunction, 235
- Caristi fixed point theorem, 637
- category
 - Ljusternik–Schnirelmann, 829
- Cerami condition, 815
- chain, 647
 - rule, 16, 34, 413, 810
- change
 - of charts, 808
 - of variable formula, 17
- chart, 808
- Chebyshev–Markov inequality, 7

- Clarke
 - normal cone, 436
 - subdifferential, 434
 - tangent cone, 436
- closed
 - function, 420
 - map, 219
 - multifunction, 226
 - operator, 44
- closure, 421
 - convex, 421
- coarea formula, 19
- coercive map, 219, 239, 430
- compact
 - homotopy, 646
 - map, 217
 - multifunction, 634
 - semigroup, 250
- compactly
 - extendable map, 646
 - homotopic maps, 646
 - null-homotopic map, 646
- complemented subspace, 811
- complete
 - integral curve, 420
 - lattice, 647
- completely continuous function, 217
- condensing map, 223
- condition
 - (A_∞) , 834
 - (A_∞^+) , 834
 - (A_∞^-) , 834
 - PS^* , 826
 - PS_c^* , 826
 - C , 815
 - C_c , 815
 - Cerami, 815
 - CPS, 816
 - Fermat, 807
 - GNPS $_m$, 853
 - NC $_c$, 855
 - NC $_c^+$, 850
 - nonsmooth C , 816
 - nonsmooth C_c , 816
 - nonsmooth Cerami, 816
 - NPS $_c$, 855, 863
 - NPS $_c'$, 863
 - NPS $_w$, 865
 - of Leray–Schauder, 640
 - Palais–Smale, 815
 - PS, 815
 - PS $_m^M$, 856
 - PS $_c^\theta$, 861
 - PS $_c$, 815
 - SC, 816
 - SC $_c$, 816, 858
 - UC, 69
 - W, 684
 - WC, 852
 - WNPS $_c$, 855
- conditional expectation, 45
- cone, 648
 - Bouligand, 436
 - Clarke, 436
 - contingent, 436
 - dual, 467, 649
 - fully regular, 649
 - generating, 649
 - minihedral, 649
 - normal, 431, 649
 - regular, 649
 - reproducing, 649
 - solid, 648
 - strongly minihedral, 649
 - tangent, 431
 - total, 649
- conjugate, 425
 - exponents, 2, 5
 - second, 425
- constrained gradient, 810
- contingent
 - tangent cone, 436
- continuous
 - homotopy, 646
 - multifunction, 225
 - selection, 230
 - selector, 230
- contractible space, 646

- contraction, 635
 - multivalued, 668
 - semigroup, 248
 - contractive map, 635
 - convergence
 - Γ , 437
 - w^* in $BV(\Omega)$, 53
 - almost uniform, 3
 - in μ -measure, 3
 - in Hausdorff sense, 236
 - in Mosco sense, 237, 440
 - in probability, 3
 - in Wijsman sense, 237
 - narrow, 22, 445
 - scalar, 237
 - strict in $BV(\Omega)$, 53
 - vague, 21
 - weak, 22, 237
 - convex
 - closure, 421
 - function, 420
 - normal integrand, 430
 - convexity theorem, 251
 - convolution, 52
 - infimal, 426
 - kernel, 28, 52
 - coordinates
 - local, 808
 - core, 422
 - countably
 - determined compactness, 643
 - generated space, 2
 - counterexample
 - Weierstrass, 984
 - counting function, 15
 - CPS-condition, 816
 - crease, 617
 - critical
 - exponent, 32
 - groups, 831, 833
 - point, 418, 617, 807, 824, 853
 - ground state, 895
 - least energy, 895
 - nondegenerate, 418, 832
 - set, 617, 816
 - value, 807
 - cube
 - Tichonov, 776
 - curve, 809
 - first integral, 420
 - integral, 418
 - maximal, 418
 - tangent, 809
 - cyclically monotone map, 428
- D**
- decomposable set, 233
 - decreasing map, 648
 - deformable space, 645
 - deformation, 645
 - lemma, 817
 - retract, 646
 - strong, 646
 - deformation lemma, 818, 819
 - degree, 618, 619, 627, 628, 630
 - Brouwer, 619, 621
 - Leray–Schauder, 624
 - demiclosed map, 639
 - demicontinuous map, 241
 - derivative
 - k -partial, 17
 - directional, 422, 433
 - distributional, 17, 24
 - Fréchet, 409
 - Gâteaux, 409
 - partial, 411
 - weak, 17, 24
 - diagonal set, 334
 - diametral point, 638
 - diffeomorphism, 418
 - differentiable map, 409
 - differential, 810
 - Dinculeanu–Foiias theorem, 12
 - direct method, 805, 806
 - directional derivative, 422
 - generalized, 433
 - dissipative map, 246

- distance
 - function, 435
 - geodesic, 822
 - Hausdorff, 227
- distributional
 - k -partial derivative, 17
 - derivative, 17, 24
- domain, 58
 - decomposition, 619, 624, 631, 633, 635, 651
 - effective, 420, 805
 - of multifunction, 231, 238
- dominated convergence theorem, 44
- dual
 - cone, 467, 649
 - problem, 427
 - value, 427
- duality
 - map, 241
 - strong, 427
 - theorem, 427
 - weak, 427
- Dugundji extension theorem, 218
- Dunford–Pettis
 - operator, 217
 - theorem, 6
- E**
- effective domain, 420, 805
- eigenfunction, 837, 839
- eigenpair, 837, 839
- eigenspace, 220
- eigenvalue, 220, 837, 839
- eigenvector, 220
- Ekeland variational principle, 813
- element
 - positive, 648
- embedding
 - theorem, 26, 32
- epiconvergence, 437
- epigraph, 420
- equi-lower semicontinuous maps, 438
- equicontinuous semigroup, 250
- equiinvariant function, 827
- equilibrium point, 419
- equivariant subdifferential, 877
- Euler formula, 451
- evolution triple, 52
- excess of set, 227
- excision condition, 620, 624, 631, 651
- existence condition, 620, 624, 631, 651
- expectation, 478
 - conditional, 45
- exponents
 - conjugate, 2
- extendable map, 646
- extension
 - operator, 25
 - theorem, 218
- extremum
 - global, 807
 - local, 413, 807
 - strict local, 807
- F**
- Fatou lemma, 44
 - generalized, 5
- Fenchel duality theorem, 427
- Fermat condition, 807
- field
 - vector, 418
- finite
 - perimeter, 18
 - rank map, 217
- finitely bounded set, 624
- first
 - deformation lemma, 817
 - integral, 420
- fixed point
 - index, 651
 - property, 646
 - space, 646
 - theorem, 635, 637, 639–641, 643–645, 648, 671
- fixed points, 827
- formula
 - change of variable, 17
 - coarea, 19

formula (*cont.*)

Hörmander, 228

integration by parts, 51

forward shift operator, 253

fountain theorem, 831

Fréchet

derivative, 409

differentiable map, 409

Fredholm

alternative theorem, 221

operator, 222

fully regular cone, 649

function

α -homogeneous, 451

inf-compact, 446

μ -essentially separably valued, 9

τ -inf-compact, 806

τ -coercive, 806

τ -lower semicontinuous, 805

k -set contraction, 223

k -set-Lipschitz, 223

w^* -measurable, 8

absolutely continuous, 16

asymptotically linear, 643

Banach indicatrix, 15

Bochner integrable, 9

Carathéodory, 34, 264

closed, 219, 420

coercive, 219, 430

compact, 217

compactly

extendable, 646

null-homotopic, 646

completely continuous, 217

condensing, 223

contraction, 635

contractive, 635

convex, 420

counting, 15

cyclically monotone, 428

decreasing, 648

deformation, 645

demiclosed, 639

distance, 435

equiinvariant, 827

extendable, 646

Hölder continuous, 32

implicit, 415

increasing, 648

indicator, 420, 431

integrable, 9

invariant, 827

locally Lipschitz, 433

lower semicontinuous, 420

maximal cyclically monotone, 428

nondegenerate, 663

nonexpansive, 635, 657

null-homotopic, 646

of bounded variation, 13, 17

of finite rank, 217

proper, 219

push-forward, 56

quasibounded, 642

regular, 434

sequentially τ -coercive, 806

sequentially τ -lower semicontinuous,
806

sign, 618

simple, 8

singular, 51

strictly

convex, 428

decreasing, 648

differentiable, 434

increasing, 648

strongly

coercive, 430

measurable, 8

sublinear, 423

upper semicontinuous, 420

weakly

compact, 217

inward, 639

measurable, 8

functional

absolutely continuous with respect
to measure, 5

singular with respect to measure, 6

functions

- compactly homotopic, 646
- equi-lower semicontinuous, 438
- homotopic, 646
- locally equicontinuous, 469

fundamental theorem of calculus, 50

G

Gâteaux

- derivative, 409
- differentiable map, 409

Gagliardo–Nirenberg–Sobolev inequality,
31

generalized

- directional derivative, 433
- Fatou lemma, 5
- Morse lemma, 832
- mountain pass theorem, 822
- pseudomonotone map, 244
- subdifferential, 434

generating cone, 649

generator

- infinitesimal, 248

genus

- Krasnoselskii, 828

geodesic

- distance, 822
- length, 822

global

- extremum, 807
- maximum, 807
- minimum, 807

GNPS_m-condition, 853

gradient, 410

- constrained, 810

graph

- measurable, 231
- of multifunction, 226, 238

greatest lower bound, 647

Green identity, 31

ground state, 895

group

- critical, 831, 833

H

Hölder

- continuous function, 32
- inequality, 2, 39

Hörmander formula, 228

Haar null set, 430

Hardy–Littlewood maximal function, 7

Hausdorff

- convergence, 236
- distance, 227
- measure of noncompactness, 223

Helly selection theorem, 15

hemicontinuous map, 241

Hessian matrix, 417

Hille–Yosida theorem, 248

homeomorphism

- local, 414

homological linking, 834

homotopic maps, 646

homotopical linking, 834

homotopy, 646

- classes, 646
- compact, 646
- invariance, 619, 624, 631, 634, 635,
651
- of type $(S)_+$, 631
- pseudomonotone, 633

Hopf theorem, 621

I

identity

- Green, 31
- Picone, 842
- Pohozaev, 842
- resolvent, 250

image

- inverse strong, 224
- inverse weak, 224
- measure, 443

immersion, 811

implicit

- function, 415
- function theorem, 415

increasing map, 648

- index, 625, 828
 - at infinity, 620
 - Morse, 832
 - of operator, 222
 - indicator function, 420, 431
 - indicatrix, 15
 - inequality
 - Chebyshev–Markov, 7
 - Gagliardo–Nirenberg–Sobolev, 31
 - Hölder, 2, 39
 - inequality (*cont.*)
 - interpolation, 39
 - Jensen, 39
 - Morse, 833
 - Poincaré, 31, 58
 - Poincaré–Wirtinger, 31
 - variational, 432
 - Young–Fenchel, 426
 - infimal convolution, 426
 - infimum, 647
 - infinitesimal generator, 248
 - integrable
 - function, 9
 - integrably bounded multifunction, 234
 - integral, 9
 - Aumann, 235
 - Bochner, 9
 - curve, 418
 - complete, 420
 - first, 420
 - set-valued, 235
 - integrand
 - convex, 430
 - normal, 430
 - integration by parts formula, 51
 - interior
 - algebraic, 422
 - relative, 640
 - interpolation inequality, 39
 - invariant
 - equimap, 827
 - function, 827
 - map, 827
 - measure, 677
 - points, 827
 - set, 827
 - invariant direction theorem, 642
 - inverse
 - mapping theorem, 414
 - strong image, 224
 - weak image, 224
 - inward map, 639
 - isometric representation, 827
- J**
- Jacobian, 617
 - matrix, 412
 - Jensen inequality, 39
 - Jordan separation theorem, 622
- K**
- Kadec–Klee property, 6
 - Kakutani fixed point theorem, 644
 - kernel
 - convolution, 28, 52
 - Kirszbraun theorem, 608
 - KKM-multifunction, 645
 - Knaster–Kuratowski–Mazurkiewicz theorem, 645
 - Kolmogorov–Riesz theorem, 7
 - Krasnoselskii fixed point theorem, 671
 - Krasnoselskii genus, 828
 - Krein theorem, 650
 - Kronecker symbol, 387, 529
 - Kuratowski
 - limit, 236
 - limit inferior, 236
 - limit superior, 236
 - measure of noncompactness, 223
 - Kuratowski–Ryll Nardzewski selection theorem, 231
 - Kuratowski–Zorn lemma, 647
 - Ky Fan fixed point theorem, 645
- L**
- Lagrange multipliers, 415
 - lattice, 647
 - complete, 647

- Lax–Milgram theorem, 432
- least
 energy, 895
 upper bound, 647
- Lebesgue
 dominated convergence theorem, 44
 theorem, 13
- left section, 647
- lemma
 deformation, 817–819
 Fatou, 44
 first deformation, 817
 generalized Fatou, 5
 Kuratowski–Zorn, 647
 Morse, 832
 second deformation, 819
 separation, 653
 Whyburn, 653
- length
 geodesic, 822
- Leray–Schauder
 alternative theorem, 642
 boundary condition, 640
 degree, 624
- limit
 inferior
 Kuratowski, 236
 Kuratowski, 236
 superior
 Kuratowski, 236
- linear
 asymptotically, 643
 relation, 647
- linearly ordered set, 647
- linking
 homological, 834
 homotopical, 834
 local at 0, 825
 sets, 820
 theorem, 822
- Lipschitz
 locally, 433
- Ljusternik theorem, 811
- Ljusternik–Schnirelmann
 category, 829
 theorem, 827
- local
 (m, n) -linking, 835
 coordinates, 808
 extremum, 413, 807
 homeomorphism, 414
 linking at 0, 825
 maximum, 413, 807
 minimum, 413, 807
 parametrization, 808
- locally
 bounded map, 240
 compact multifunction, 227
 equicontinuous functions, 469
 finite perimeter, 18
 Lipschitz
 map, 433
- lower
 bound, 647
 greatest, 647
 section, 647
 semicontinuous
 almost, 261
 function, 420
 multifunction, 225
- lower semicontinuous
 function, 805
- lsc, 225
- Lusin
 (N) -property, 16
 theorem, 251
- Lyapunov convexity theorem, 251
- M**
- Mackey topology, 360
- manifold
 C^k -Banach, 808
 Nehari, 847
- map
 $(S)_+$, 245
 C^1 , 410

- map (*cont.*)
 - α -homogeneous, 451
 - k -set contraction, 223
 - k -set-Lipschitz, 223
 - m -accretive, 246
 - m -dissipative, 246
 - n -linear, 416
 - accretive, 246
 - asymptotically linear, 643
 - bounded, 240
 - Carathéodory, 264
 - closed, 219, 420
 - coercive, 219, 239, 430
 - compact, 217
 - compactly
 - extendable, 646
 - null-homotopic, 646
 - completely continuous, 217
- map (*cont.*)
 - condensing, 223
 - contraction, 635
 - contractive, 635
 - convex, 420
 - cyclically monotone, 428
 - decreasing, 648
 - deformation, 645
 - demiclosed, 639
 - demicontinuous, 241
 - diffeomorphism, 418
 - differentiable, 409
 - dissipative, 246
 - duality, 241
 - equi-invariant, 827
 - extendable, 646
 - Fréchet differentiable, 409
 - Gâteaux differentiable, 409
 - generalized pseudomonotone, 244
 - hemicontinuous, 241
 - increasing, 648
 - invariant, 827
 - locally
 - bounded, 240
 - Lipschitz, 433
 - lower semicontinuous, 420
 - maximal
 - accretive, 246
 - cyclically monotone, 428
 - monotone, 239
 - monotone, 238
 - multilinear, 416
 - nondegenerate, 663
 - nonexpansive, 243, 635, 657
 - null-homotopic, 646
 - of finite rank, 217
 - proper, 219, 420
 - pseudomonotone, 244
 - quasibounded, 642
 - regular, 434
 - strictly
 - convex, 428
 - decreasing, 648
 - differentiable, 434
 - increasing, 648
 - monotone, 238
 - strongly
 - coercive, 239, 430
 - monotone, 238
 - sublinear, 423
 - uniformly monotone, 239
 - upper semicontinuous, 420
 - weakly
 - compact, 217
 - inward, 639
- maps
 - compactly homotopic, 646
 - equi-lower semicontinuous, 438
 - homotopic, 646
- matrix
 - Hessian, 417
 - Jacobian, 412
- maximal
 - accretive map, 246
 - cyclically monotone map, 428
 - element, 647
 - function, 7
 - integral curve, 418
 - complete, 420
 - monotone map, 239

- maximum
 - global, 807
 - local, 413, 807
 - principle
 - nonlinear, 841
 - strict local, 807
- Mazur theorem, 424
- mean value theorem, 435
- measurability theorem, 8
- measurable
 - graph, 231
 - multifunction, 231
 - space countably generated, 2
- measure
 - image, 443
 - invariant, 677
 - of bounded variation, 10
 - of noncompactness, 223
 - probability, 442
 - Radon, 442
 - subprobability, 442
 - test, 430
 - Young, 443
- metric
 - ε -chainable, 668
 - projection, 263
 - projection map, 479
- Meyers–Serrin
 - theorem, 28
- Michael selection theorem, 230
- minihedral cone, 649
- minimal
 - element, 647
 - section, 247, 275
- minimax theorem, 843
- minimum
 - global, 807
 - local, 413, 807
 - strict local, 807
- mollification, 28
- mollifier, 28, 52
- monotone
 - cyclically, 428
 - map, 238
- Moreau–Yosida
 - approximation, 459
 - regularization, 459
- Morse
 - index, 832
 - inequality, 833
 - lemma, 832
 - polynomial, 833
- Mosco
 - convergence, 237, 440
- mountain pass
 - theorem, 821
 - nonsmooth, 824
 - type, 823
- multifunction
 - L^p -integrably bounded, 234
 - a -lsc, 261
 - h -Carathéodory, 235
 - h -continuous, 229
 - h -lower semicontinuous, 229
 - h -upper semicontinuous, 229
 - m -accretive, 246
 - m -dissipative, 246
 - accretive, 246
 - almost lower semicontinuous, 261
 - Carathéodory, 235
 - closed, 226
 - compact, 634
 - continuous, 225
 - dissipative, 246
 - domain, 231, 238
 - generalized pseudomonotone, 244
 - graph, 238
 - integrably bounded, 234
 - KKM, 645
 - locally compact, 227
 - lower semicontinuous, 225
 - maximal accretive, 246
 - measurable, 231
 - pseudomonotone, 244
 - upper semicontinuous, 224
 - Vietoris continuous, 225
- multilinear map, 416
- multiplication theorem, 621, 625

- multiplicity
 - algebraic, 625
- multipliers
 - Lagrange, 415
- multivalued
 - k -contraction, 668
- N**
- narrow
 - convergence, 22, 445
 - topology, 443, 445
- natural constraint, 812
- NC_c -condition, 855
- NC_c^+ -condition, 850
- negative polar, 436
 - cone, 431
- Nehari manifold, 847
- Nemytskii operator, 34
- nondegenerate
 - critical point, 418, 832
 - function, 663
- nonexpansive
 - function, 657
 - map, 243, 635
- nonlinear maximum principle, 841
- nonsmooth
 - C_c -condition, 816
 - C -condition, 816
 - Cerami condition, 816
 - condition
 - Cerami, 816
 - mountain pass theorem, 824
- norm
 - weak, 234
- normal
 - cone, 431, 436, 649
 - Clarke, 436
 - integrand, 430
 - convex, 430
 - operator, 222
 - structure, 638
- normalization, 619, 624, 631, 633, 635, 651
- normalized duality map, 241
- NPS_c -condition, 855, 863
- NPS'_c -condition, 863
- NPS_w -condition, 865
- null-homotopic map, 646
- nullity, 832
- O**
- OBS, 648
- operator
 - closed, 44
 - Dunford–Pettis, 217
 - extension, 25
 - forward shift, 253
 - Fredholm, 222
 - index, 222
 - Nemytskii, 34
 - normal, 222
 - orthogonal projection, 222
 - projection, 222
 - superposition, 34
 - trace, 31
 - unitary, 222
- order
 - bounded set, 647
 - cone, 648
 - solid, 648
 - interval, 647
 - partial, 646
- ordered Banach space, 648
- orthogonal projection
 - operator, 222
- P**
- Palais–Smale condition, 815
- parametrization
 - local, 808
- partial
 - derivative, 411
 - weak, 27
 - Fréchet derivative, 411
 - Gâteaux derivative, 411
 - order, 646
 - strict, 647
- partially ordered set, 647
- partition of interval, 13

- perimeter, 18
 - finite, 18
 - locally finite, 18
 - Pettis measurability theorem, 8
 - Picone identity, 842
 - pivot space, 243
 - Pohozaev identity, 842
 - Poincaré
 - generalized inequality, 58
 - inequality, 31
 - theorem, 25
 - Poincaré–Wirtinger inequality, 31
 - point
 - absorbing, 240
 - critical, 418, 807, 824, 853
 - diametral, 638
 - equilibrium, 419
 - fixed, 827
 - invariant, 827
 - of mountain pass type, 823
 - regular, 419, 807
 - spectrum, 220
 - polar
 - cone
 - negative, 431
 - negative, 436
 - polynomial
 - Morse, 833
 - positive element, 648
 - primal
 - problem, 427
 - value, 427
 - probability
 - measures, 442
 - transition, 442
 - problem
 - dual, 427
 - primal, 427
 - Prohorov theorem, 24, 446
 - projection
 - metric, 263
 - operator, 222
 - orthogonal operator, 222
 - tangent bundle, 809
 - proper map, 219, 420
 - property
 - AP, 219
 - approximation, 219
 - Kadec–Klee, 6
 - Radon–Nikodym, 11
 - RNP, 11
 - semigroup, 248, 249
 - U, 235
 - PS_m^M -condition, 856
 - PS_c^θ -condition, 861
 - PS_c -condition, 815
 - PS-condition, 815
 - pseudogradient vector field, 818
 - pseudomonotone
 - homotopy, 633
 - map, 244
 - push-forward function, 56
- Q**
- quasibounded map, 642
 - quasinorm, 642
- R**
- Rademacher theorem, 433
 - Radon measures, 442
 - Radon–Nikodym property, 11
 - rectangular cell, 20
 - reduction condition, 651
 - reflexivity, 646
 - regular
 - cone, 649
 - map, 434
 - point, 419, 807
 - value, 617, 807
 - regularization, 28
 - Moreau–Yosida, 459
 - relation
 - linear, 647
 - of partial order, 646
 - total, 647
 - relative interior, 640
 - relaxation principle, 439
 - Rellich–Kondrachov embedding theorem,

- representation
 - isometric, 827
 - of group, 827
- reproducing cone, 649
- residual
 - set, 226
 - spectrum, 221
- resolvent, 220, 243, 249, 274
 - identity, 250
 - set, 220
- retract, 650
 - absolute, 650
 - absolute neighbourhood, 650
- retraction, 650
- Riesz representation theorem, 5
- right section, 647
- RNP, 11

- S**
- saddle point theorem, 821
- Sard theorem, 617
- SC_c -condition, 816, 858
- SC-condition, 816
- scalar convergence, 237
- Schauder
 - fixed point theorem, 641
 - theorem, 219
- second
 - conjugate, 425
 - deformation lemma, 819
- section
 - left, 647
 - lower, 647
 - minimal, 247, 275
 - right, 647
 - upper, 647
- selection
 - continuous, 230
 - theorem, 15, 230–232
- selector
 - continuous, 230
- semicontinuous multifunction
 - lower, 225
 - upper, 224
- semigroup, 248
 - compact, 250
 - contraction, 248
 - equicontinuous, 250
 - of nonexpansive maps, 249
 - property, 248, 249
- separate, 822
- separation
 - lemma, 653
 - theorem, 622
- sequence
 - equi-lower semicontinuous, 438
 - of mollifiers, 28
 - of multiindices
 - admissible, 825
- sequentially τ -coercive function, 806
- set
 - G -invariant, 827
 - w -boundedly compact, 263
 - absorbing, 422
 - bounded
 - above, 647
 - below, 647
 - in a direction, 63
 - boundedly compact, 263
 - critical, 617, 816
 - decomposable, 233
 - diagonal, 334
 - finitely bounded, 624
 - Haar null, 430
 - invariant, 827
 - linearly ordered, 647
 - of fixed points, 827
 - of invariant points, 827
 - order below, 647
 - partially ordered, 647
 - residual, 226
 - sublevel, 816
 - superlevel, 816
 - totally ordered, 647
 - uniformly
 - integrable, 4
 - tight, 446
- set-valued integral, 235

- sets
 - linking, 820
 - shifting theorem, 832
 - sign function, 618
 - simple function, 8
 - singular function, 51
 - singularity with respect to measure, 6
 - smooth variational principle, 942
 - Smulian theorem, 429
 - Sobolev
 - critical exponent, 32
 - embedding theorem, 26, 32
 - solid order cone, 648
 - solution
 - weak, 840
 - Souslin space, 232
 - space
 - angelic, 643
 - Asplund, 425
 - contractible, 646
 - countably generated, 2
 - deformable, 645
 - fixed point, 646
 - of approximation property, 219
 - of countably determined
 - compactness, 643
 - pivot, 243
 - Souslin, 232
 - tangent, 809
 - spectral theorem, 221
 - spectrum, 220
 - point, 220
 - residua, 221
 - strict
 - convergence in $BV(\Omega)$, 53
 - local
 - extremum, 807
 - maximum, 807
 - minimum, 807
 - partial order, 647
 - strictly
 - convex, 428
 - map, 428
 - decreasing map, 648
 - differentiable map, 434
 - increasing map, 648
 - monotone map, 238
 - strong
 - deformation retract, 646
 - duality, 427
 - inverse image, 224
 - strongly
 - coercive map, 239, 430
 - measurable function, 8
 - minihedral cone, 649
 - monotone map, 238
 - structure
 - w^* -normal, 638
 - normal, 638
 - subdifferential, 423
 - Clarke, 434
 - equivariant, 877
 - generalized, 434
 - subgradient, 423
 - sublevel, 816
 - set, 806
 - sublinear function, 423
 - submeasure
 - Young, 443
 - submersion, 811
 - subprobability
 - measures, 442
 - transition, 442
 - subspace
 - complemented, 811
 - superlevel, 816
 - superposition operator, 34
 - support function, 227
 - supremum, 647
 - symbol
 - Kronecker, 387, 529
 - symmetric
 - criticality theorem, 831
 - mountain pass theorem, 829
- T**
- tangent
 - Bouligand cone, 436

- tangent (*cont.*)
- bundle, 809
 - projection, 809
 - cone, 431, 436
 - Clarke, 436
 - contingent cone, 436
 - curves, 809
 - approach, 809
 - space, 809
- test measure, 430
- theorem
- selection theorem, 231
 - alternative theorem, 642
 - Arens–Eells theorem, 653
 - Banach fixed point theorem, 635
 - Birkhoff–Kellogg theorem, 642
 - Borsuk
 - fixed point theorem, 640
 - theorem, 621
 - Borsuk–Ulam theorem, 622
 - Borwein–Preiss smooth variational principle, 942
 - Bourbaki–Kneser fixed point theorem, 648
 - Brouwer fixed point theorem, 639
 - Caristi fixed point theorem, 637
 - chain rule, 16, 34, 413
 - change of variable formula, 17
 - Chebyshev–Markov inequality, 7
 - coarea formula, 19
 - convexity theorem, 251
 - deformation lemma, 817–819
 - Dinculeanu–Foiias theorem, 12
 - dominated convergence, 44
 - duality theorem, 427
 - Dugundji extension theorem, 218
 - Dunford–Pettis theorem, 6
 - Ekeland variational principle, 813
 - embedding theorem, 26, 32
 - Euler formula, 451
 - extension theorem, 218
 - Fatou lemma, 44
 - Fenchel duality theorem, 427
 - first deformation lemma, 817
 - fixed point theorem, 635, 637, 639–641, 643–645, 648, 671
 - fountain, 831
 - Fredholm alternative, 221
 - fundamental theorem of calculus, 50
 - Gagliardo–Nirenberg–Sobolev inequality, 31
 - generalized
 - Fatou lemma, 5
 - Morse lemma, 832
 - mountain pass, 822
 - Poincaré inequality, 58
 - Green identity, 31
 - Hölder inequality, 2, 39
 - Hörmander formula, 228
 - Helly selection theorem, 15
 - Hille–Yosida theorem, 248
 - Hopf theorem, 621
 - implicit function, 415
 - integration by parts formula, 51
 - interpolation inequality, 39
 - invariant direction theorem, 642
 - inverse mapping, 414
 - Jensen inequality, 39
 - Jordan separation theorem, 622
 - Kakutani fixed point theorem, 644
 - Kirschbraun theorem, 608
 - Knaster–Kuratowski–Mazurkiewicz theorem, 645
 - Kolmogorov–Riesz theorem, 7
 - Krasnoselskii fixed point theorem, 671
 - Krein theorem, 650
 - Kuratowski–Ryll Nardzewski selection theorem, 231
 - Kuratowski–Zorn lemma, 647
 - Ky Fan fixed point theorem, 645
 - Lax–Milgram theorem, 432
 - Lebesgue
 - dominated convergence, 44
 - theorem, 13

- Leray–Schauder alternative theorem, 642
 - linking, 822
 - Ljusternik, 811
 - Ljusternik–Schnirelmann, 827
 - Lusin theorem, 251
 - Lyapunov convexity theorem, 251
 - Mazur theorem, 424
 - mean value theorem, 435
 - measurability theorem, 8
 - Meyers–Serrin theorem, 28
 - Michael selection theorem, 230
 - minimax theorem, 843
 - Morse inequality, 833
 - mountain pass, 821
 - multiplication theorem, 621, 625
 - nonlinear maximum principle, 841
 - nonsmooth mountain pass, 824
 - pectral theorem, 221
 - Pettis measurability theorem, 8
 - Picone identity, 842
 - Pohozaev identity, 842
 - Poincaré
 - inequality, 31
 - theorem, 25
 - Poincaré–Wirtinger inequality, 31
 - Prohorov theorem, 24, 446
 - Rademacher theorem, 433
 - relaxation principle, 439
 - Rellich–Kondrachov embedding theorem, 32
 - Riesz representation theorem, 5
 - saddle point, 821
 - Sard theorem, 617
 - Schauder, 219
 - fixed point theorem, 641
 - theorem, 219
 - second deformation lemma, 819
 - selection theorem, 15, 230, 232
 - separation lemma, 653
 - separation theorem, 622
 - shifting theorem, 832
 - Smulian theorem, 429
 - Sobolev embedding theorem, 26, 32
 - symmetric
 - criticality, 831
 - mountain pass, 829
 - Tichonov fixed point theorem, 643
 - Vitali convergence theorem, 5
 - von Neumann minimax theorem, 843
 - Whyburn lemma, 653
 - Yankov–von Neumann–Aumann selection theorem, 232
 - Yosida–Hewitt decomposition theorem, 6
 - Young–Fenchel inequality, 426
 - Tichonov
 - cube, 776
 - fixed point theorem, 643
 - tight
 - set, 446
 - tightness
 - uniform, 23
 - topology
 - Mackey, 360
 - narrow, 443, 445
 - total
 - cone, 649
 - relation, 647
 - variation, 13
 - totally ordered set, 647
 - trace, 31
 - operator, 31
 - transition
 - probability, 442
 - subprobability, 442
 - transitivity, 647
 - triple
 - evolution, 52
- U**
- U property, 235
 - UC-condition, 69
 - uniform tightness, 23
 - uniformly
 - integrable set, 4
 - monotone map, 239
 - tight set, 446

unique continuation property, 838

unitary operator, 222

upper

bound, 647

least, 647

section, 647

semicontinuous

function, 420

multifunction, 224

usc, 224

V

vague convergence, 21

value

critical, 807

dual, 427

function, 259

primal, 427

regular, 617, 807

variation, 18

bounded, 10

of a vector measure, 10

variational

inequality, 432

principle

Borwein–Preiss, 942

Ekeland, 813

vector

field, 418

measure, 10

Vietoris continuous multifunction,

225

Vitali convergence theorem, 5

von Neumann minimax theorem, 843

W

W-condition, 684

WC-condition, 852

weak

k -partial derivative, 17

Asplund space, 425

convergence, 22, 237

of measures, 6

derivative, 17, 24

duality, 427

inverse image, 224

norm, 234

partial derivative, 27

star convergence of measures, 6

weak solution, 840

weakly

compact map, 217

inward map, 639

measurable function, 8

Weierstrass counterexample, 984

Whyburn lemma, 653

Wijsman convergence, 237

WNPS_c-condition, 855

Y

Yankov–von Neumann–Aumann

selection theorem, 232

Yosida approximation, 243, 274

Yosida–Hewitt decomposition theorem, 6

Young

measure, 443

associated with function, 443

submeasure, 443

Young–Fenchel inequality, 426