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List of Symbols

Throughout the text, $\subseteq$ means subset, $\subset$ means proper subset

$\mathbb{Z}_n$	integers modulo n	1.1
$\mathbb{Z}$	integers	1.1
$\langle A \rangle$	subgroup generated by A	1.1
S_n	symmetric group	1.2
A_n	alternating group	1.2
D_{2n}	dihedral group	1.2
φ	Euler phi function	1.1, 1.3
$\trianglelefteq$	normal subgroup	1.3
$\triangleleft$	proper normal subgrouad	1.3
ker	kernel	1.3, 2.2
$\cong$	isomorphism	1.4
$Z(G)$	center of a group	1.4
$H \times K$	direct product	1.5
$\mathbb{Q}$	rationals	2.1
$M_n(R)$	matrix ring	2.1
$R[X]$	polynomial ring	2.1
$R[[X]]$	formal power series ring	2.
End	endomorphism ring	2.1
$\langle X \rangle$	ideal generated by X	2.2
UFD	unique factorization domain	2.6
PID	principal ideal domain	2.6
ED	Euclidean domain	2.7
$\min(\alpha, F)$	minimal polynomial	3.1
$\bigvee_i K_i$	composite of fields	3.1
$\mathrm{Gal}(E/F)$	Galois group	3.5
0	the module $\{0\}$ and the ideal $\{0\}$	4.1
$\oplus_i M_i$	direct sum of modules	4.3
$\sum_i M_i$	sum of modules	4.3
$\mathrm{Hom}_R(M, N)$	set of R-module homomorphisms from M to N	4.4
$\mathrm{End}_R(M)$	endomorphism ring	4.4
$g \bullet x$	group action	5.1
G'	commutator subgroup	5.7
$G^{(i)}$	derived subgroups	5.7
$\langle S \mid K \rangle$	presentation of a group	5.8
$\mathcal{F}(H)$	fixed field	6.1
$\mathcal{G}(K)$	fixing group	6.1
$GF(p^n)$	finite field with p^n elements	6.4
$\Psi_n(X)$	n^{th} cyclotomic polynomial	6.5
Δ	product of differences of roots	6.6
D	discriminant	6.6, 7.4
$N[E/F]$	norm	7.3
$T[E/F]$	trace	7.3
char	characteristic polynomial	7.3
$n_P(I)$	exponent of P in the factorization of I	7.7
v_p	p-adic valuation	7.9
$\mid \mid_p$	p-adic absolute value	7.9
$V(S)$	variety in affine space	8.1
$I(X)$	ideal of a set of points	8.1
$k[X_1, \ldots, X_n]$	polynomial ring in n variables over the field k	8.1
$\sqrt{I}$	radical of an ideal	8.3
$k(X_1, \ldots, X_n)$	rational function field over k	8.4

$S^{-1}R$	localization of the ring R by S	8.5
$S^{-1}M$	localization of the module M by S	8.5
$\mathcal{N}(R)$	nilradical of the ring R	8.6
$M \otimes_R N$	tensor product of modules	8.7
UMP	universal mapping property	8.7
$A \otimes B$	tensor (Kronecker) product of matrices	8.7
kG	group algebra	9.5
RG	group ring	9.5
$J(M), J(R)$	Jacobson radical	9.7
$\mathrm{Hom}_R(M, -)$, $\mathrm{Hom}_R(-, N)$	hom functors	10.3
$M \otimes_R -$, $- \otimes_R N$	tensor fuctors	10.3
$\mathbb{Q}/\mathbb{Z}$	additive group of rationals mod 1	10.6 (also 1.1, Problem 7)
$\mathbb{Z}(p^\infty)$	quasicyclic group	A10
$G[n]$	elements of G annihilated by n	A10
H_n	homology functor	S1
$f \simeq g$	chain homotopy	S1
∂	connecting homomorphism	S2, S3
$P_* \to M$	projective resolution	S4
$M \to E_*$	injective resolution	S4
L_nF	left derived functor	S5
R^nF	right derived functor	S5
Tor	derived functor of $\otimes$	S5
Ext	derived functor of Hom	S5

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