

# AUTO GENERATED INDEX

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### 1. Alphabetized definitions

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- universally locally acyclic* in 93.1
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- versal* in 12.2
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- very reasonable* in 6.1
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- $w$ -local* in 2.3
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- weak functor* in 29.5
- weak generator* in 36.3
- weak ideal of definition* in 4.8
- weak normalization of  $X$  in  $Y$*  in 55.6
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- weak orbit* in 5.4
- weak Serre subcategory* in 10.1
- weak solution for  $A \subset B$*  in 115.1
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- weaker* in 47.8
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- weakly adic* in 9.7

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- weakly associated* in 66.1
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- weakly converges to  $H^n(\text{Tot}(K^\bullet))$*  in 25.2
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- Zariski covering* in 12.5
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- Zariski locally quasi-separated* in 3.1
- Zariski pair* in 10.1
- Zariski sheaf* in 4.3
- Zariski topos* in 21.1
- Zariski, étale, smooth, syntomic, or fppf covering* in 8.4
- Zariski* in 17.3
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- zero scheme* in 14.8
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- Čech cohomology groups* in 18.1
- Čech complex* in 9.1
- Čech complex* in 8.1
- Čech complex* in 18.1

## 2. Definitions listed per chapter

- Introduction**
  - In 2.8: *functor*
  - In 2.9: *faithful, fully faithful, essentially surjective*
- Conventions**
- Set Theory**
  - In 2.10: *subcategory, full subcategory, strictly full*
- Categories**
  - In 2.15: *natural transformation, morphism of functors*
  - In 2.17: *equivalence of categories, quasi-inverse*
  - In 2.20: *product category*
- In 2.1: *category*
- In 2.4: *isomorphism*
- In 2.5: *groupoid*

- In 3.1: *opposite category*
- In 3.2: *contravariant*
- In 3.3: *presheaf of sets on  $\mathcal{C}$ , presheaf*
- In 3.6: *representable*
- In 4.1: *product*
- In 4.2: *has products of pairs of objects*
- In 5.1: *coproduct, amalgamated sum*
- In 5.2: *has coproducts of pairs of objects*
- In 6.1: *fibre product*
- In 6.2: *cartesian*
- In 6.3: *has fibre products*
- In 6.4: *representable*
- In 8.2: *representable,  $F$  is relatively representable over  $G$*
- In 9.1: *pushout*
- In 9.2: *cocartesian*
- In 10.1: *equalizer*
- In 11.1: *coequalizer*
- In 12.1: *initial, final*
- In 13.1: *monomorphism, epimorphism*
- In 14.1: *limit*
- In 14.2: *colimit*
- In 14.6: *product*
- In 14.7: *coproduct*
- In 16.1: *connected*
- In 17.1:  *$\mathcal{I}$  is cofinal in  $\mathcal{J}$ , cofinal*
- In 17.3:  *$\mathcal{I}$  is initial in  $\mathcal{J}$ , initial*
- In 19.1: *directed, filtered, directed, filtered*
- In 20.1: *codirected, cofiltered, codirected, cofiltered*
- In 21.1: *preorder, preordered set, directed set, partial order, partially ordered set, directed partially ordered set*
- In 21.2: *system over  $I$  in  $\mathcal{C}$ , inductive system over  $I$  in  $\mathcal{C}$ , inverse system over  $I$  in  $\mathcal{C}$ , projective system over  $I$  in  $\mathcal{C}$ , transition maps*
- In 21.4: *directed system, directed inverse system*
- In 22.1: *essentially constant, value, essentially constant, value*
- In 22.2: *essentially constant system, essentially constant inverse system*
- In 23.1: *left exact, right exact, exact*
- In 24.1: *left adjoint, right adjoint*
- In 26.1: *categorically compact*
- In 27.1: *left multiplicative system, right multiplicative system, multiplicative system*
- In 27.4:  *$s^{-1}f$*
- In 27.12:  *$fs^{-1}$*
- In 27.20: *saturated*
- In 28.1: *horizontal*
- In 29.1: *2-category, 1-morphisms, 2-morphisms, vertical, composition, horizontal*
- In 29.2: *sub 2-category*
- In 29.4: *equivalent*
- In 29.5: *functor, weak functor, pseudo functor*
- In 30.1: *(2,1)-category*
- In 31.1: *final object*
- In 31.2: *2-fibre product of  $f$  and  $g$*
- In 32.1: *2-category of categories over  $\mathcal{C}$*
- In 32.2: *fibre category, lift,  $x$  lies over  $U$ , lift,  $\phi$  lies over  $f$*
- In 33.1: *strongly cartesian morphism, strongly  $\mathcal{C}$ -cartesian morphism*
- In 33.5: *fibred category over  $\mathcal{C}$*
- In 33.6: *choice of pullbacks, pullback functor*
- In 33.9: *2-category of fibred categories over  $\mathcal{C}$*
- In 34.2: *relative inertia of  $\mathcal{S}$  over  $\mathcal{S}'$ , inertia fibred category  $\mathcal{I}_{\mathcal{S}}$  of  $\mathcal{S}$*
- In 35.1: *fibred in groupoids*
- In 35.6: *2-category of categories fibred in groupoids over  $\mathcal{C}$*
- In 36.2: *split fibred category,  $\mathcal{S}_F$*
- In 37.2: *split category fibred in groupoids,  $\mathcal{S}_F$*
- In 38.1: *discrete*
- In 38.2: *category fibred in sets, category fibred in discrete categories*
- In 38.3: *2-category of categories fibred in sets over  $\mathcal{C}$*
- In 39.1: *setoid*
- In 39.2: *category fibred in setoids*
- In 39.3: *2-category of categories fibred in setoids over  $\mathcal{C}$*
- In 40.1: *representable*
- In 42.3: *representable,  $\mathcal{X}$  is relatively representable over  $\mathcal{Y}$*
- In 43.1: *monoidal category*

- In 43.2: *functor of monoidal categories*
- In 43.4: *invertible*
- In 43.5: *left dual, right dual*
- In 43.9: *symmetric monoidal category*
- In 43.11: *functor of symmetric monoidal categories*
- In 44.1: *morphism of dotted arrows*
- Topology**
- In 4.1: *separated*
- In 5.1: *base for the topology on  $X$ , basis for the topology on  $X$*
- In 5.4: *subbase for the topology on  $X$ , subbasis for the topology on  $X$*
- In 6.3: *strict map of topological spaces, submersive*
- In 7.1: *connected, connected component*
- In 7.8: *totally disconnected*
- In 7.10: *locally connected*
- In 8.1: *irreducible, irreducible component*
- In 8.6: *generic point, Kolmogorov, quasi-sober, sober*
- In 9.1: *Noetherian, locally Noetherian*
- In 10.1: *chain of irreducible closed subsets, length, dimension, Krull dimension, Krull dimension of  $X$  at  $x$*
- In 10.5: *equidimensional*
- In 11.1: *codimension*
- In 11.4: *catenary*
- In 12.1: *quasi-compact, quasi-compact, retrocompact*
- In 13.1: *locally quasi-compact*
- In 15.1: *constructible, locally constructible*
- In 17.2: *closed, Bourbaki-proper, quasi-proper, universally closed, proper*
- In 18.1: *Jacobson*
- In 19.1: *specialization, generalization, stable under specialization, stable under generalization*
- In 19.4: *specializations lift along  $f$ , specializing, generalizations lift along  $f$ , generalizing*
- In 20.1: *immediate specialization, dimension function*
- In 21.1: *interior, nowhere dense*
- In 22.1: *profinite*
- In 23.1: *spectral, spectral*
- In 26.1: *extremally disconnected*
- In 27.2: *isolated point*
- In 28.1: *partition, parts, refines*
- In 28.2: *good stratification*
- In 28.3: *stratification, strata*
- In 28.4: *locally finite*
- In 30.1: *topological group, homomorphism of topological groups*
- In 30.5: *profinite group*
- In 30.7: *topological ring, homomorphism of topological rings*
- In 30.10: *topological module, homomorphism of topological modules*
- Sheaves on Spaces**
- In 3.1: *presheaf  $\mathcal{F}$  of sets on  $X$ , morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves of sets on  $X$*
- In 3.2: *constant presheaf with value  $A$*
- In 4.4: *presheaf of abelian groups on  $X$ , abelian presheaf over  $X$ , morphism of abelian presheaves over  $X$*
- In 5.1: *presheaf  $\mathcal{F}$  on  $X$  with values in  $\mathcal{C}$ , morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves with value in  $\mathcal{C}$*
- In 5.2: *underlying presheaf of sets of  $\mathcal{F}$*
- In 6.1: *presheaf of  $\mathcal{O}$ -modules, morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves of  $\mathcal{O}$ -modules*
- In 7.1: *sheaf  $\mathcal{F}$  of sets on  $X$ , morphism of sheaves of sets*
- In 7.4: *constant sheaf with value  $A$*
- In 8.1: *abelian sheaf on  $X$ , sheaf of abelian groups on  $X$*
- In 9.1: *sheaf*
- In 10.1: *sheaf of  $\mathcal{O}$ -modules, morphism of sheaves of  $\mathcal{O}$ -modules*
- In 11.2: *separated*
- In 15.1: *type of algebraic structure*
- In 16.2: *subpresheaf, subsheaf, injective, surjective, injective, surjective*
- In 21.7:  *$f$ -map  $\xi : \mathcal{G} \rightarrow \mathcal{F}$*
- In 21.9: *composition of  $\varphi$  and  $\psi$*
- In 25.1: *ringed space, morphism of ringed spaces*
- In 25.3: *composition of morphisms of ringed spaces*
- In 26.1: *pushforward, pullback*
- In 27.1: *skyscraper sheaf at  $x$  with value  $A$ , skyscraper sheaf, skyscraper sheaf, skyscraper sheaf, skyscraper sheaf*

- In 30.1: presheaf  $\mathcal{F}$  of sets on  $\mathcal{B}$ , morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves of sets on  $\mathcal{B}$
- In 30.2: sheaf  $\mathcal{F}$  of sets on  $\mathcal{B}$ , morphism of sheaves of sets on  $\mathcal{B}$
- In 30.8: presheaf  $\mathcal{F}$  with values in  $\mathcal{C}$  on  $\mathcal{B}$ , morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves with values in  $\mathcal{C}$  on  $\mathcal{B}$ , sheaf  $\mathcal{F}$  with values in  $\mathcal{C}$  on  $\mathcal{B}$
- In 30.11: presheaf of  $\mathcal{O}$ -modules  $\mathcal{F}$  on  $\mathcal{B}$ , morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves of  $\mathcal{O}$ -modules on  $\mathcal{B}$ , sheaf  $\mathcal{F}$  of  $\mathcal{O}$ -modules on  $\mathcal{B}$
- In 31.2: restriction of  $\mathcal{G}$  to  $U$ , restriction of  $\mathcal{G}$  to  $U$ , open subspace of  $(X, \mathcal{O})$  associated to  $U$ , restriction of  $\mathcal{G}$  to  $U$
- In 31.3: extension of  $\mathcal{F}$  by the empty set  $j_{p!}\mathcal{F}$ , extension of  $\mathcal{F}$  by the empty set  $j_!\mathcal{F}$
- In 31.5: extension  $j_{p!}\mathcal{F}$  of  $\mathcal{F}$  by 0, extension  $j_!\mathcal{F}$  of  $\mathcal{F}$  by 0, extension  $j_{p!}\mathcal{F}$  of  $\mathcal{F}$  by  $e$ , extension  $j_!\mathcal{F}$  of  $\mathcal{F}$  by  $e$ , extension by 0, extension by 0
- Sites and Sheaves**
- In 2.1: presheaf of sets, Morphisms of presheaves
- In 2.2: presheaf, morphism
- In 3.1: injective, surjective
- In 3.3: subpresheaf
- In 3.5: image of  $\varphi$
- In 6.1: family of morphisms with fixed target
- In 6.2: site, coverings of  $\mathcal{C}$
- In 7.1: sheaf
- In 7.5:  $Sh(\mathcal{C})$
- In 7.6: sheaf
- In 8.1: morphism of families of maps with fixed target of  $\mathcal{C}$  from  $\mathcal{U}$  to  $\mathcal{V}$ , morphism from  $\mathcal{U}$  to  $\mathcal{V}$ , refinement
- In 8.2: combinatorially equivalent, tautologically equivalent
- In 10.9: separated
- In 10.11: sheaf associated to  $\mathcal{F}$
- In 11.1: injective, surjective
- In 12.1: effective epimorphism, universal effective epimorphism
- In 12.2: weaker than the canonical topology, subcanonical
- In 12.3: representable sheaves,  $\underline{U}$
- In 13.1: continuous
- In 14.1: morphism of sites
- In 14.5: composition
- In 15.1: topos, morphism of topoi, composition  $f \circ g$
- In 17.1: quasi-compact
- In 17.4: quasi-compact, quasi-compact
- In 20.1: cocontinuous
- In 25.1: localization of the site  $\mathcal{C}$  at the object  $U$ , localization morphism, direct image functor, restriction of  $\mathcal{F}$  to  $\mathcal{C}/U$ , extension of  $\mathcal{G}$  by the empty set
- In 29.2: special cocontinuous functor  $u$  from  $\mathcal{C}$  to  $\mathcal{D}$
- In 30.4: localization of the topos  $Sh(\mathcal{C})$  at  $\mathcal{F}$ , localization morphism
- In 32.1: point of the topos  $Sh(\mathcal{C})$
- In 32.2: point  $p$  of the site  $\mathcal{C}$
- In 32.6: skyscraper sheaf
- In 36.1: 2-morphism from  $f$  to  $g$
- In 37.2: morphism  $f : p \rightarrow p'$
- In 38.1: conservative, has enough points
- In 40.2: weakly contractible, enough weakly contractible objects, enough  $P$  objects
- In 42.1: sheaf theoretically empty
- In 42.3: almost cocontinuous
- In 43.1: embedding
- In 43.2: subtopos
- In 43.4: open subtopos
- In 43.6: closed subtopos
- In 43.7: open immersion, closed immersion
- In 44.1: pushforward
- In 45.1: global sections
- In 47.1: sieve  $S$  on  $U$
- In 47.3: sieve on  $U$  generated by the morphisms  $f_i$
- In 47.4: pullback of  $S$  by  $f$
- In 47.6: topology on  $\mathcal{C}$
- In 47.8: finer, stronger, coarser, weaker
- In 47.10: sheaf
- In 47.12: canonical topology
- In 48.2: topology associated to  $\mathcal{C}$
- In 49.2: separated
- In 49.4: sheaf associated to  $\mathcal{F}$
- In 52.1: point  $p$
- Stacks**

- In 2.2: *presheaf of morphisms from  $x$  to  $y$ , presheaf of isomorphisms from  $x$  to  $y$*
- In 3.1: *descent datum  $(X_i, \varphi_{ij})$  in  $\mathcal{S}$  relative to the family  $\{f_i : U_i \rightarrow U\}$ , cocycle condition, morphism  $\psi : (X_i, \varphi_{ij}) \rightarrow (X'_i, \varphi'_{ij})$  of descent data*
- In 3.4: *pullback functor*
- In 3.5: *trivial descent datum, canonical descent datum, effective*
- In 4.1: *stack*
- In 4.5: *2-category of stacks over  $\mathcal{C}$*
- In 5.1: *stack in groupoids*
- In 5.5: *2-category of stacks in groupoids over  $\mathcal{C}$*
- In 6.1: *stack in setoids, stack in sets, stack in discrete categories*
- In 6.5: *2-category of stacks in setoids over  $\mathcal{C}$*
- In 10.2: *structure of site on  $\mathcal{S}$  inherited from  $\mathcal{C}$ ,  $\mathcal{S}$  is endowed with the topology inherited from  $\mathcal{C}$*
- In 11.1: *gerbe*
- In 11.4: *gerbe over*
- In 12.4:  *$f_*\mathcal{S}$ , pushforward of  $\mathcal{S}$  along  $f$*
- In 12.9:  *$f^{-1}\mathcal{S}$ , pullback of  $\mathcal{S}$  along  $f$*
- In 15.8: *automorphisms of  $E$  over  $F$ , automorphisms of  $E/F$*
- In 16.2: *splitting field of  $P$  over  $F$*
- In 16.4: *normal closure  $E$  over  $F$*
- In 20.1: *trace, norm*
- In 20.6: *trace pairing*
- In 20.8: *discriminant of  $L/K$*
- In 21.1: *Galois*
- In 21.3: *Galois group*
- In 26.1: *algebraically independent, purely transcendental extension, transcendence basis*
- In 26.4: *transcendence degree*
- In 26.9: *algebraic closure of  $k$  in  $K$ , algebraically closed in  $K$*
- In 27.1: *compositum of  $K$  and  $L$  in  $\Omega$*
- In 27.2: *linearly disjoint over  $k$  in  $\Omega$*
- In 28.1: *algebraic, separable, purely inseparable, normal, Galois*

**Commutative Algebra**

**Fields**

- In 2.1: *field, subfield*
- In 2.2: *domain, integral domain*
- In 5.1: *characteristic, prime subfield of  $F$*
- In 6.2: *field extension*
- In 6.3: *tower*
- In 6.6: *generates the field extension, finitely generated field extension*
- In 7.1: *degree, finite*
- In 7.8: *number field*
- In 8.1: *algebraic, algebraic extension*
- In 9.1: *minimal polynomial*
- In 10.1: *algebraically closed*
- In 10.3: *algebraic closure*
- In 11.1: *relatively prime*
- In 12.2: *separable, separable, separable*
- In 12.6: *separable degree*
- In 14.1: *purely inseparable, purely inseparable*
- In 14.7: *separable degree, inseparable degree, degree of inseparability*
- In 15.1: *normal*
- In 5.1: *finite  $R$ -module, finitely generated  $R$ -module, finitely presented  $R$ -module,  $R$ -module of finite presentation*
- In 6.1: *finite type,  $S$  is a finite type  $R$ -algebra, finite presentation*
- In 7.1: *finite*
- In 8.1: *system  $(M_i, \mu_{ij})$  of  $R$ -modules over  $I$ , directed system*
- In 8.6: *homomorphism of systems*
- In 9.1: *multiplicative subset of  $R$*
- In 9.2: *localization of  $A$  with respect to  $S$*
- In 9.6: *localization*
- In 11.2: *relation*
- In 12.1:  *$R$ -bilinear*
- In 12.6:  *$(A, B)$ -bimodule*
- In 14.1: *base change, base change*
- In 17.1: *spectrum*
- In 17.3: *Zariski, standard opens*
- In 18.1: *local ring, local homomorphism of local rings, local ring map  $\varphi : R \rightarrow S$*
- In 28.2: *Oka family*
- In 32.1: *locally nilpotent, nilpotent*
- In 35.1: *Jacobson ring*
- In 36.1: *integral over  $R$ , integral*
- In 36.9: *integral closure, integrally closed*
- In 37.1: *normal*
- In 37.3: *almost integral over  $R$ , completely normal*

- In 37.11: *normal*
- In 38.1: *integral over  $I$*
- In 39.1: *flat, faithfully flat, flat, faithfully flat*
- In 40.1: *support of  $M$*
- In 40.3: *annihilator of  $m$ , annihilator of  $M$*
- In 41.1: *going up, going down*
- In 42.1: *separably generated over  $k$ , separable over  $k$*
- In 43.1: *geometrically reduced over  $k$*
- In 45.1: *perfect*
- In 45.5: *perfect closure*
- In 47.4: *geometrically irreducible over  $k$*
- In 48.3: *geometrically connected over  $k$*
- In 49.1: *geometrically integral over  $k$*
- In 50.1: *dominates, valuation ring, centered*
- In 50.13: *value group, valuation, discrete valuation ring*
- In 52.1: *length*
- In 52.9: *simple*
- In 53.1: *Artinian*
- In 54.1: *essentially of finite type, essentially of finite presentation*
- In 57.1: *homogeneous spectrum*
- In 58.3: *numerical polynomial*
- In 59.1: *an ideal of definition of  $R$*
- In 59.6: *Hilbert polynomial*
- In 59.8:  *$d(M)$*
- In 60.1: *chain of prime ideals, length*
- In 60.2: *Krull dimension*
- In 60.3: *height*
- In 60.10: *system of parameters of  $R$ , regular local ring, regular system of parameters*
- In 63.1: *associated*
- In 64.1: *symbolic power*
- In 65.2: *relative assassin of  $N$  over  $S/R$*
- In 66.1: *weakly associated*
- In 67.1: *embedded associated primes, embedded primes of  $R$*
- In 68.1:  *$M$ -regular sequence,  $M$ -regular sequence in  $I$ , regular sequence*
- In 69.1:  *$M$ -quasi-regular, quasi-regular sequence*
- In 70.1: *blowup algebra, Rees algebra, affine blowup algebra*
- In 71.2: *resolution, resolution of  $M$  by free  $R$ -modules, resolution of  $M$  by finite free  $R$ -modules*
- In 72.1:  *$I$ -depth, depth*
- In 77.1: *projective*
- In 78.1: *locally free, finite locally free, finite locally free of rank  $r$*
- In 82.1: *universally injective, universally exact*
- In 84.1: *direct sum dévissage, Kaplansky dévissage*
- In 86.1: *Mittag-Leffler*
- In 88.1: *Mittag-Leffler directed system of modules*
- In 88.2: *dominates*
- In 88.7: *Mittag-Leffler*
- In 90.1: *coherent module, coherent ring*
- In 96.2:  *$I$ -adically complete,  $I$ -adically complete*
- In 102.5: *rank*
- In 103.1: *Cohen-Macaulay*
- In 103.8: *maximal Cohen-Macaulay*
- In 103.12: *Cohen-Macaulay*
- In 104.1: *Cohen-Macaulay*
- In 104.6: *Cohen-Macaulay*
- In 105.1: *catenary*
- In 105.3: *universally catenary*
- In 108.1: *pure*
- In 109.2: *finite projective dimension, projective dimension*
- In 109.10: *finite global dimension, global dimension*
- In 110.7: *regular*
- In 112.5: *local ring of the fibre at  $\mathfrak{q}$*
- In 119.8: *uniformizer*
- In 120.1: *associates, irreducible, prime*
- In 120.4: *unique factorization domain, UFD*
- In 120.12: *principal ideal domain, PID*
- In 120.14: *Dedekind domain*
- In 121.2: *order of vanishing along  $R$*
- In 121.3: *lattice in  $V$*
- In 121.5: *distance between  $M$  and  $M'$*
- In 122.3: *quasi-finite at  $\mathfrak{q}$ , quasi-finite*
- In 123.7: *strongly transcendental over  $R$*
- In 125.1: *relative dimension of  $S/R$  at  $\mathfrak{q}$ , relative dimension of*

- In 131.1: *derivation, R-derivation, Leibniz rule*
- In 131.2: *module of Kähler differentials, module of differentials*
- In 133.1: *differential operator  $D : M \rightarrow N$  of order  $k$*
- In 133.4: *module of principal parts of order  $k$*
- In 134.1: *naive cotangent complex*
- In 135.1: *global complete intersection over  $k$ , local complete intersection over  $k$*
- In 135.5: *complete intersection (over  $k$ )*
- In 136.1: *syntomic, flat local complete intersection over  $R$*
- In 136.5: *relative global complete intersection*
- In 137.1: *smooth*
- In 137.6: *standard smooth algebra over  $R$*
- In 137.11: *smooth at  $\mathfrak{q}$*
- In 138.1: *formally smooth over  $R$*
- In 141.1: *small extension*
- In 143.1: *étale, étale at  $\mathfrak{q}$*
- In 144.1: *standard étale*
- In 148.1: *formally unramified over  $R$*
- In 149.2: *universal first order thickening, conormal module,  $C_{S/R}$*
- In 150.1: *formally étale over  $R$*
- In 151.1: *unramified,  $G$ -unramified, unramified at  $\mathfrak{q}$ ,  $G$ -unramified at  $\mathfrak{q}$*
- In 153.1: *henselian, strictly henselian*
- In 155.3: *henselization, strict henselization of  $R$  with respect to  $\kappa \subset \kappa^{sep}$ , strict henselization*
- In 157.1:  *$(R_k)$ , regular in codimension  $\leq k$ ,  $(S_k)$*
- In 160.1: *complete local ring*
- In 160.4: *coefficient ring*
- In 160.5: *Cohen ring*
- In 161.1:  *$N-1$ ,  $N-2$ , Japanese*
- In 162.1: *universally Japanese, Nagata ring*
- In 162.9: *analytically unramified, analytically unramified*
- In 165.2: *geometrically normal*
- In 166.2: *geometrically regular*
- Brauer groups**
- In 2.1: *finite*
- In 2.2: *skew field*
- In 2.3: *simple, simple*
- In 2.4: *central*
- In 2.5: *opposite algebra*
- In 5.2: *Brauer group*
- In 8.1: *splits, splitting field*
- Homological Algebra**
- In 3.1: *preadditive, additive*
- In 3.3: *zero object*
- In 3.5: *direct sum*
- In 3.8: *additive*
- In 3.9: *kernel, cokernel, coimage of  $f$ , image of  $f$*
- In 4.1: *Karoubian*
- In 5.1: *abelian*
- In 5.3: *injective, surjective, subobject, quotient*
- In 5.7: *complex, exact at  $y$ , exact at  $x_i$ , exact, exact sequence, exact complex, short exact sequence*
- In 5.9: *split*
- In 6.1: *extension  $E$  of  $B$  by  $A$ , morphism of extensions*
- In 6.2: *Ext-group*
- In 9.1: *simple*
- In 9.2: *Artinian, Artinian*
- In 9.3: *Noetherian, Noetherian*
- In 10.1: *Serre subcategory, weak Serre subcategory*
- In 10.5: *kernel of the functor  $F$*
- In 11.1: *zeroth  $K$ -group of  $\mathcal{A}$*
- In 12.1: *cohomological  $\delta$ -functor,  $\delta$ -functor*
- In 12.2: *morphism of  $\delta$ -functors from  $F$  to  $G$*
- In 12.3: *universal  $\delta$ -functor*
- In 13.2: *homotopy equivalence, homotopy equivalent*
- In 13.4: *quasi-isomorphism, acyclic*
- In 13.8: *homotopy equivalence, homotopy equivalent*
- In 13.10: *quasi-isomorphism, acyclic*
- In 14.1:  *$k$ -shifted chain complex  $A[k]_\bullet$*
- In 14.2:  *$H_{i+k}(A_\bullet) \rightarrow H_i(A[k]_\bullet)$*
- In 14.7:  *$k$ -shifted cochain complex  $A[k]^\bullet$*
- In 14.8:  *$H^{i+k}(A^\bullet) \rightarrow H^i(A[k]^\bullet)$*
- In 16.1: *category of graded objects of  $\mathcal{A}$*
- In 16.4: *shift*

- In 17.1: *additive monoidal category*
  - In 18.1: *double complex*
  - In 18.3: *associated simple complex, associated total complex*
  - In 19.1: *decreasing filtration, filtered object of  $\mathcal{A}$ , morphism  $(A, F) \rightarrow (B, F)$  of filtered objects, induced filtration, quotient filtration, finite, separated, exhaustive*
  - In 19.3: *strict*
  - In 20.1: *spectral sequence in  $\mathcal{A}$ , morphism of spectral sequences*
  - In 20.2: *limit, degenerates at  $E_r$*
  - In 21.1: *exact couple, morphism of exact couples*
  - In 21.3: *spectral sequence associated to the exact couple*
  - In 22.1: *differential object, morphism of differential objects*
  - In 22.3: *homology*
  - In 22.5: *spectral sequence associated to  $(A, d, \alpha)$*
  - In 23.1: *filtered differential object*
  - In 23.4: *induced filtration*
  - In 23.6: *weakly converges to  $H(K)$ , abuts to  $H(K)$*
  - In 24.1: *filtered complex  $K^\bullet$  of  $\mathcal{A}$*
  - In 24.5: *induced filtration*
  - In 24.7: *regular, coregular, bounded, bounded below, bounded above*
  - In 24.9: *weakly converges to  $H^*(K^\bullet)$ , abuts to  $H^*(K^\bullet)$ , converges to  $H^*(K^\bullet)$*
  - In 25.2: *weakly converges to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$ , abuts to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$ , converges to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$ , weakly converges to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$ , abuts to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$ , converges to  $H^n(\text{Tot}(K^{\bullet,\bullet}))$*
  - In 27.1: *injective*
  - In 27.4: *enough injectives*
  - In 27.5: *functorial injective embeddings*
  - In 28.1: *projective*
  - In 28.4: *enough projectives*
  - In 28.5: *functorial projective surjections*
  - In 31.2: *Mittag-Leffler condition, ML*
- Derived Categories**
- In 3.1: *triangle, morphism of triangles*
  - In 3.2: *triangulated category, distinguished triangles, pre-triangulated category*
  - In 3.3: *exact functor, triangulated functor*
  - In 3.4: *pre-triangulated subcategory, triangulated subcategory*
  - In 3.5: *homological, cohomological*
  - In 3.6:  *$\delta$ -functor from  $\mathcal{A}$  to  $\mathcal{D}$ , image of the short exact sequence under the given  $\delta$ -functor*
  - In 5.1: *compatible with the triangulated structure*
  - In 6.1: *saturated*
  - In 6.5: *kernel of  $F$ , kernel of  $H$*
  - In 6.7: *quotient category  $\mathcal{D}/\mathcal{B}$ , quotient functor*
  - In 8.1: *category of (cochain) complexes, bounded below, bounded above, bounded*
  - In 9.1: *cone*
  - In 9.4: *termwise split injection  $\alpha : A^\bullet \rightarrow B^\bullet$ , termwise split surjection  $\beta : B^\bullet \rightarrow C^\bullet$*
  - In 9.9: *termwise split exact sequence of complexes of  $\mathcal{A}$ , triangle associated to the termwise split sequence of complexes*
  - In 10.1: *distinguished triangle of  $K(\mathcal{A})$*
  - In 11.3: *derived category of  $\mathcal{A}$ , bounded derived category*
  - In 13.1: *category of finite filtered objects of  $\mathcal{A}$*
  - In 13.2: *filtered quasi-isomorphism, filtered acyclic*
  - In 13.5: *filtered derived category of  $\mathcal{A}$*
  - In 13.7: *bounded filtered derived category*
  - In 14.2: *right derived functor  $RF$  is defined at, value of  $RF$  at  $X$ , left derived functor  $LF$  is defined at, value of  $LF$  at  $X$*
  - In 14.9: *right derivable, everywhere defined, left derivable, everywhere defined*
  - In 14.10: *computes, computes*
  - In 15.3: *right derived functors of  $F$ , left derived functors of  $F$ , right acyclic for  $F$ , acyclic for  $RF$ , left acyclic for  $F$ , acyclic for  $LF$*
  - In 16.2:  *$i$ th right derived functor  $R^i F$  of  $F$*

- In 18.1: *injective resolution of  $A$ , injective resolution of  $K^\bullet$*
  - In 19.1: *projective resolution of  $A$ , projective resolution of  $K^\bullet$*
  - In 21.1: *Cartan-Eilenberg resolution*
  - In 23.2: *resolution functor*
  - In 26.1: *filtered injective*
  - In 27.1:  *$i$ th extension group*
  - In 27.4: *Yoneda extension, equivalent*
  - In 28.1: *zeroth  $K$ -group of  $\mathcal{D}$*
  - In 31.1:  *$K$ -injective*
  - In 33.1: *derived colimit, homotopy colimit*
  - In 34.1: *derived limit, homotopy limit*
  - In 36.3: *classical generator, strong generator, weak generator, generator*
  - In 37.1: *compact object*
  - In 37.5: *compactly generated*
  - In 40.1: *right orthogonal, left orthogonal*
  - In 40.9: *right admissible, left admissible, two-sided admissible*
  - In 41.1: *Postnikov system, morphism of Postnikov systems*
- Simplicial Methods**
- In 2.1:  $\delta_j^n : [n-1] \rightarrow [n]$ ,  $\sigma_j^n : [n+1] \rightarrow [n]$
  - In 3.1: *simplicial object  $U$  of  $\mathcal{C}$ , simplicial set, simplicial abelian group, morphism of simplicial objects  $U \rightarrow U'$ , category of simplicial objects of  $\mathcal{C}$*
  - In 5.1: *cosimplicial object  $U$  of  $\mathcal{C}$ , cosimplicial set, cosimplicial abelian group, morphism of cosimplicial objects  $U \rightarrow U'$ , category of cosimplicial objects of  $\mathcal{C}$*
  - In 6.1: *product of  $U$  and  $V$*
  - In 7.1: *fibre product of  $V$  and  $W$  over  $U$*
  - In 8.1: *pushout of  $V$  and  $W$  over  $U$*
  - In 9.1: *product of  $U$  and  $V$*
  - In 10.1: *fibre product of  $V$  and  $W$  over  $U$*
  - In 11.1:  *$n$ -simplex of  $U$ , face of  $x$ , degeneracy of  $x$ , degenerate*
  - In 12.1:  *$n$ -truncated simplicial object of  $\mathcal{C}$ , morphism of  $n$ -truncated simplicial objects*
  - In 13.1: *product  $U \times V$  of  $U$  and  $V$ , product  $U \times V$  exists*
  - In 14.1:  $\text{Hom}(U, V)$
  - In 15.1:  $\text{Hom}(U, V)$
  - In 17.1:  $\text{Hom}(U, V)$
  - In 18.1: *split, split*
  - In 20.1: *augmentation  $\epsilon : U \rightarrow X$  of  $U$  towards an object  $X$  of  $\mathcal{C}$*
  - In 22.3: *Eilenberg-MacLane object  $K(A, k)$*
  - In 26.1: *homotopy from  $a$  to  $b$ , homotopic, in the same homotopy class*
  - In 26.6: *homotopy equivalence, homotopy equivalent*
  - In 28.1: *homotopy from  $a$  to  $b$ , homotopic, in the same homotopy class*
  - In 30.1: *trivial Kan fibration*
  - In 31.1: *Kan fibration, Kan complex*
- More on Algebra**
- In 3.1: *stably isomorphic, stably free*
  - In 8.3:  *$k$ th Fitting ideal*
  - In 10.1: *Zariski pair*
  - In 11.1: *henselian pair*
  - In 14.1: *absolutely integrally closed*
  - In 15.1: *auto-associated*
  - In 22.1: *torsion, torsion free*
  - In 23.1: *reflexive*
  - In 23.9: *reflexive hull*
  - In 24.1: *content ideal of  $x$*
  - In 26.1: *strict transform of  $M$  along  $R \rightarrow R[\frac{t}{a}]$*
  - In 28.1: *Koszul complex*
  - In 28.2: *Koszul complex on  $f_1, \dots, f_r$*
  - In 30.1:  *$M$ -Koszul-regular,  $M$ - $H_1$ -regular, Koszul-regular,  $H_1$ -regular*
  - In 32.1: *regular ideal, Koszul-regular ideal,  $H_1$ -regular ideal, quasi-regular ideal*
  - In 33.2: *local complete intersection*
  - In 36.1: *topological ring, topological module, homomorphism of topological modules, homomorphism of topological rings, linearly topologized, linearly topologized, ideal of definition, pre-admissible, admissible, pre-adic, adic*
  - In 37.1: *formally smooth over  $R$*
  - In 37.3: *formally smooth for the  $\mathfrak{n}$ -adic topology*
  - In 41.1: *regular*
  - In 46.1:  *$p$ -independent over  $k$ ,  $p$ -basis of  $K$  over  $k$*

- In 47.1:  $J-0, J-1, J-2$
  - In 50.1:  $G$ -ring
  - In 52.1: *quasi-excellent, excellent*
  - In 55.1: *injective*
  - In 55.5:  $M \mapsto M^\vee$ , *free module*
  - In 59.1:  $K$ -flat
  - In 59.13: *derived tensor product*
  - In 61.1: *Tor independent over  $R$*
  - In 64.1:  $m$ -pseudo-coherent, *pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent*
  - In 66.1: *tor-amplitude in  $[a, b]$ , finite tor dimension, tor dimension  $\leq d$ , finite tor dimension*
  - In 68.1: *finite projective dimension, projective-amplitude in  $[a, b]$*
  - In 69.1: *finite injective dimension, injective-amplitude in  $[a, b]$*
  - In 70.4:  $I$ -projective
  - In 74.1: *perfect, perfect*
  - In 80.2: *finitely presented relative to  $R$*
  - In 81.4:  $m$ -pseudo-coherent relative to  $R$ , *pseudo-coherent relative to  $R$ ,  $m$ -pseudo-coherent relative to  $R$ , pseudo-coherent relative to  $R$*
  - In 82.1: *pseudo-coherent ring map, perfect ring map*
  - In 83.1:  $R$ -perfect, *perfect relative to  $R$*
  - In 88.1:  $I$ -power torsion module, *an  $f$ -power torsion module*
  - In 91.4: *derived complete with respect to  $I$ , derived complete with respect to  $I$*
  - In 104.1: *absolutely flat, weakly étale, absolutely flat*
  - In 104.3: *weak dimension  $\leq d$*
  - In 106.1: *unibranch, geometrically unibranch*
  - In 106.6: *number of branches of  $A$ , number of geometric branches of  $A$*
  - In 109.1: *formally catenary*
  - In 111.1: *extension of discrete valuation rings, ramification index, weakly unramified, residual degree, residue degree*
  - In 111.7: *unramified with respect to  $A$ , tamely ramified with respect to  $A$ , totally ramified with respect to  $A$*
  - In 112.3: *decomposition group of  $\mathfrak{m}$ , inertia group of  $\mathfrak{m}$*
  - In 112.6: *wild inertia group of  $\mathfrak{m}$ , tame inertia group of  $\mathfrak{m}$*
  - In 113.3: *mixed characteristic, absolute ramification index*
  - In 115.1: *weak solution for  $A \subset B$ , solution for  $A \subset B$ , separable solution*
  - In 117.1: *invertible, trivial*
  - In 123.1: *extension of valuation rings, weakly unramified, residual degree, residue degree*
  - In 124.5: *Bézout domain, elementary divisor domain*
- Smoothing Ring Maps**
- In 2.1: *singular ideal of  $A$  over  $R$*
  - In 2.3: *elementary standard in  $A$  over  $R$ , strictly standard in  $A$  over  $R$*
- Sheaves of Modules**
- In 4.1: *generated by global sections, generate*
  - In 4.5: *subsheaf generated by the  $s_i$*
  - In 5.1: *support of  $\mathcal{F}$ , support of  $s$*
  - In 8.1: *locally generated by sections*
  - In 9.1: *finite type*
  - In 10.1: *quasi-coherent sheaf of  $\mathcal{O}_X$ -modules*
  - In 10.6: *sheaf associated to the module  $M$  and the ring map  $\alpha$ , sheaf associated to the module  $M$*
  - In 11.1: *finite presentation*
  - In 12.1: *coherent  $\mathcal{O}_X$ -module*
  - In 13.1: *closed immersion of ringed spaces*
  - In 14.1: *locally free, finite locally free, finite locally free of rank  $r$*
  - In 17.1: *flat*
  - In 17.3: *flat at  $x$*
  - In 20.1: *flat at  $x$ , flat*
  - In 20.3: *flat over  $Y$  at a point  $x \in X$ , flat over  $Y$*
  - In 23.1: *annihilator*
  - In 24.1: *Koszul complex*
  - In 24.2: *Koszul complex on  $f_1, \dots, f_r$*
  - In 25.1: *invertible  $\mathcal{O}_X$ -module, trivial*
  - In 25.6: *tensor power*
  - In 25.7: *associated graded ring*
  - In 25.9: *Picard group*

- In 28.1:  $\mathcal{O}_1$ -derivation,  $\varphi$ -derivation, Leibniz rule
- In 28.3: module of differentials, universal  $\varphi$ -derivation
- In 28.10:  $S$ -derivation, sheaf of differentials  $\Omega_{X/S}$  of  $X$  over  $S$
- In 29.1: differential operator  $D : \mathcal{F} \rightarrow \mathcal{G}$  of order  $k$
- In 29.4: module of principal parts of order  $k$
- In 29.8: differential operator of order  $k$  on  $X/S$
- In 30.1: de Rham complex of  $\mathcal{B}$  over  $A$
- In 30.4: de Rham complex
- In 31.1: naive cotangent complex
- In 31.6: naive cotangent complex
- Modules on Sites**
- In 4.1: free abelian presheaf
- In 5.1: free abelian sheaf
- In 6.1: ringed site, structure sheaf, morphism of ringed sites, composition of morphisms of ringed sites
- In 7.1: ringed topos, structure sheaf, morphism of ringed topoi, composition of morphisms of ringed topoi
- In 8.1: 2-morphism from  $f$  to  $g$
- In 9.1: presheaf of  $\mathcal{O}$ -modules, morphism  $\varphi : \mathcal{F} \rightarrow \mathcal{G}$  of presheaves of  $\mathcal{O}$ -modules
- In 10.1: sheaf of  $\mathcal{O}$ -modules, morphism of sheaves of  $\mathcal{O}$ -modules
- In 13.1: pushforward, pullback
- In 16.1:  $g_{p!}\mathcal{F}$ ,  $g_!\mathcal{F} = (g_{p!}\mathcal{F})^\#$
- In 17.1: free  $\mathcal{O}$ -module, finite free, generated by global sections, generated by  $r$  global sections, generated by finitely many global sections, global presentation, global finite presentation
- In 19.1: localization of the ringed site  $(\mathcal{C}, \mathcal{O})$  at the object  $U$ , localization morphism, direct image functor, restriction of  $\mathcal{F}$  to  $\mathcal{C}/U$ , extension by zero
- In 21.2: localization of the ringed topos  $(Sh(\mathcal{C}), \mathcal{O})$  at  $\mathcal{F}$ , localization morphism
- In 23.1: locally free, finite locally free, locally generated by sections, locally generated by  $r$  sections, of finite type, quasi-coherent, of finite presentation, coherent
- In 28.1: flat, flat, flat, flat
- In 31.1: flat, flat
- In 31.3: flat over  $(Sh(\mathcal{D}), \mathcal{O}')$
- In 32.1: rank  $r$ , invertible,  $\mathcal{O}^*$
- In 32.6: Picard group
- In 33.1:  $\mathcal{O}_1$ -derivation,  $\varphi$ -derivation, Leibniz rule
- In 33.3: module of differentials, universal  $\varphi$ -derivation
- In 33.10:  $Y$ -derivation, sheaf of differentials  $\Omega_{X/Y}$  of  $X$  over  $Y$ , universal  $Y$ -derivation
- In 34.1: differential operator  $D : \mathcal{F} \rightarrow \mathcal{G}$  of order  $k$
- In 34.4: module of principal parts of order  $k$
- In 35.1: naive cotangent complex
- In 35.4: naive cotangent complex
- In 40.4: locally ringed site
- In 40.6: locally ringed
- In 40.9: morphism of locally ringed topoi, morphism of locally ringed sites
- In 43.1: constant sheaf, locally constant, finite locally constant
- Injectives**
- In 2.4:  $\alpha$ -small with respect to  $I$
- In 10.1: generator, Grothendieck abelian category
- In 11.2: size
- Cohomology of Sheaves**
- In 4.1: torsor,  $\mathcal{G}$ -torsor, morphism of  $\mathcal{G}$ -torsors, trivial  $\mathcal{G}$ -torsor
- In 9.1: Čech complex, Čech cohomology groups
- In 12.1: flasque, flabby
- In 23.1: alternating Čech complex
- In 23.2: ordered Čech complex
- In 24.2: locally finite
- In 26.2:  $K$ -flat
- In 26.14: derived tensor product
- In 26.15: Tor
- In 46.1: strictly perfect
- In 47.1:  $m$ -pseudo-coherent, pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent
- In 48.1: tor-amplitude in  $[a, b]$ , finite tor dimension, locally has finite tor dimension, tor dimension  $\leq d$

In 49.1: *perfect, perfect*

### Cohomology on Sites

In 4.1: *pseudo torsor, pseudo  $\mathcal{G}$ -torsor, morphism of pseudo  $\mathcal{G}$ -torsors, torsor,  $\mathcal{G}$ -torsor, morphism of  $\mathcal{G}$ -torsors, trivial  $\mathcal{G}$ -torsor*

In 8.1: *Čech complex, Čech cohomology groups*

In 13.4: *totally acyclic*

In 17.2:  *$K$ -flat*

In 17.13: *derived tensor product*

In 17.14: *Tor*

In 31.2: *qc covering*

In 41.1: *simplicial  $\mathcal{A}_\bullet$ -module, simplicial sheaf of  $\mathcal{A}_\bullet$ -modules*

In 43.1:  *$QC(\mathcal{O})$*

In 44.1: *strictly perfect*

In 45.1:  *$m$ -pseudo-coherent, pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent*

In 46.1: *tor-amplitude in  $[a, b]$ , finite tor dimension, locally has finite tor dimension, tor dimension  $\leq d$*

In 47.1: *perfect, perfect*

### Differential Graded Algebra

In 3.1: *differential graded algebra over  $R$*

In 3.2: *homomorphism of differential graded algebras*

In 3.3: *commutative, strictly commutative*

In 3.4: *tensor product differential graded algebra*

In 4.1: *differential graded module, homomorphism of differential graded modules*

In 4.3:  *$k$ -shifted module*

In 5.1: *homotopy between  $f$  and  $g$ , homotopic*

In 5.3: *homotopy category*

In 6.1: *cone*

In 7.1: *admissible monomorphism, admissible epimorphism, admissible short exact sequence*

In 8.2: *triangle associated to  $0 \rightarrow K \rightarrow L \rightarrow M \rightarrow 0$ , distinguished triangle*

In 11.1: *opposite differential graded algebra*

In 11.3:  *$k$ th shifted  $A$ -module,  $k$ th shifted  $A$ -module*

In 22.2: *derived category of  $(A, d)$*

In 24.1:  *$R$ -linear category  $\mathcal{A}$*

In 24.2: *functor of  $R$ -linear categories,  $R$ -linear functor*

In 25.1: *graded category  $\mathcal{A}$  over  $R$*

In 25.2: *functor of graded categories over  $R$ , graded functor*

In 25.3:  *$\mathcal{A}^0$*

In 25.4: *graded direct sum*

In 26.1: *differential graded category  $\mathcal{A}$  over  $R$*

In 26.2: *functor of differential graded categories over  $R$*

In 26.3: *category of complexes of  $\mathcal{A}$ , homotopy category of  $\mathcal{A}$*

In 26.4: *differential graded direct sum*

In 28.1:  *$(A, B)$ -bimodule, graded  $(A, B)$ -bimodule, differential graded  $(A, B)$ -bimodule*

### Divided Power Algebra

In 2.1: *divided power structure*

In 3.1: *divided power ring, homomorphism of divided power rings*

In 4.1: *extends*

In 6.1: *divided power structure*

In 6.5: *compatible with the differential graded structure*

In 8.5: *complete intersection, local complete intersection*

### Differential Graded Sheaves

In 3.1: *sheaf of graded  $\mathcal{O}$ -algebras, sheaf of graded algebras, homomorphism of graded  $\mathcal{O}$ -algebras*

In 4.1: *graded  $\mathcal{A}$ -module, graded module, homomorphism of graded  $\mathcal{A}$ -modules*

In 8.1: *graded  $(\mathcal{A}, \mathcal{B})$ -bimodule, homomorphism of graded  $(\mathcal{A}, \mathcal{B})$ -bimodules*

In 12.1: *sheaf of differential graded  $\mathcal{O}$ -algebras, sheaf of differential graded algebras, homomorphism of differential graded  $\mathcal{O}$ -algebras*

In 13.1: *differential graded  $\mathcal{A}$ -module, differential graded module, homomorphism of differential graded  $\mathcal{A}$ -modules*

- In 17.1: differential graded  $(\mathcal{A}, \mathcal{B})$ -bimodule, homomorphism of differential graded  $(\mathcal{A}, \mathcal{B})$ -bimodules
- In 21.1: homotopy between  $f$  and  $g$ , homotopic
- In 21.2: homotopy category
- In 22.2: cone
- In 25.2: graded injective
- In 25.7:  $K$ -injective
- In 26.4: derived category of  $(\mathcal{A}, d)$
- In 28.2: derived tensor product, derived pullback
- In 29.2: derived internal hom, derived pushforward
- In 33.1:  $QC(\mathcal{A}, d)$
- In 12.5: scheme structure on  $Z$ , reduced induced scheme structure, reduction  $X_{red}$  of  $X$
- In 15.1: representable by a scheme, representable
- In 15.3: satisfies the sheaf property for the Zariski topology, subfunctor  $H \subset F$ , representable by open immersions, covers  $F$
- In 17.1: fibre product
- In 17.7: inverse image  $f^{-1}(Z)$  of the closed subscheme  $Z$
- In 18.1: scheme over  $S$ , structure morphism, scheme over  $R$ , morphism  $f : X \rightarrow Y$  of schemes over  $S$ , base change, base change, base change
- In 18.3: preserved under arbitrary base change, preserved under base change, preserved under arbitrary base change, preserved under base change
- In 18.4: scheme theoretic fibre  $X_s$  of  $f$  over  $s$ , fibre of  $f$  over  $s$
- In 19.1: quasi-compact
- In 20.1: universally closed
- In 20.3: satisfies the existence part of the valuative criterion, satisfies the uniqueness part of the valuative criterion
- In 21.3: separated, quasi-separated, separated, quasi-separated
- In 23.1: monomorphism

### Hypercoverings

- In 2.1: semi-representable objects, semi-representable objects over  $X$
- In 2.2: which associates a presheaf to a semi-representable object
- In 3.1: covering, covering
- In 3.3: hypercovering of  $X$
- In 4.1: homology of  $K$
- In 6.1: hypercovering of  $\mathcal{G}$ , hypercovering

### Schemes

- In 2.1: locally ringed space  $(X, \mathcal{O}_X)$ , local ring of  $X$  at  $x$ , residue field of  $X$  at  $x$ , morphism of locally ringed spaces
- In 3.1: open immersion
- In 3.3: open subspace of  $X$  associated to  $U$
- In 4.1: closed immersion
- In 4.4: closed subspace of  $X$  associated to the sheaf of ideals  $\mathcal{I}$
- In 5.2: standard open covering, standard open covering
- In 5.3: structure sheaf  $\mathcal{O}_{\text{Spec}(R)}$  of the spectrum of  $R$ , spectrum
- In 5.5: affine scheme, morphism of affine schemes
- In 9.1: scheme, morphism of schemes
- In 10.2: open immersion, open subscheme, closed immersion, closed subscheme, immersion, locally closed immersion
- In 12.1: reduced

### Constructions of Schemes

- In 4.5: relative spectrum of  $\mathcal{A}$  over  $S$ , spectrum of  $\mathcal{A}$  over  $S$
- In 5.1: affine  $n$ -space over  $S$ , affine  $n$ -space over  $R$
- In 6.1: vector bundle associated to  $\mathcal{E}$
- In 6.2: vector bundle  $\pi : V \rightarrow S$  over  $S$ , morphism of vector bundles over  $S$
- In 7.1: cone associated to  $\mathcal{A}$ , affine cone associated to  $\mathcal{A}$
- In 7.2: cone  $\pi : C \rightarrow S$  over  $S$ , morphism of cones
- In 8.2: standard open covering
- In 8.3: structure sheaf  $\mathcal{O}_{\text{Proj}(S)}$  of the homogeneous spectrum of  $S$ , homogeneous spectrum
- In 10.1: twist of the structure sheaf of  $\text{Proj}(S)$

- In 13.2: *projective  $n$ -space over  $\mathbf{Z}$ , projective  $n$ -space over  $S$ , projective  $n$ -space over  $R$*
- In 16.7: *relative homogeneous spectrum of  $\mathcal{A}$  over  $S$ , homogeneous spectrum of  $\mathcal{A}$  over  $S$ , relative Proj of  $\mathcal{A}$  over  $S$*
- In 21.1: *projective bundle associated to  $\mathcal{E}$ , twist of the structure sheaf*
- In 22.2: *Grassmannian over  $\mathbf{Z}$ , Grassmannian over  $S$ , Grassmannian over  $R$*
- In 9.1: *surjective*
- In 10.1: *universally injective, radicial*
- In 11.1: *affine*
- In 12.1: *ample family of invertible modules on  $X$*
- In 13.1: *quasi-affine*
- In 14.1: *local, stable under base change, stable under composition*
- In 14.2: *locally of type  $P$*
- In 15.1: *finite type at  $x \in X$ , locally of finite type, finite type*

**Properties of Schemes**

- In 3.1: *integral*
- In 4.1: *local*
- In 4.2: *locally  $P$*
- In 5.1: *locally Noetherian, Noetherian*
- In 6.1: *Jacobson*
- In 7.1: *normal*
- In 8.1: *Cohen-Macaulay*
- In 9.1: *regular, nonsingular*
- In 10.1: *dimension, dimension of  $X$  at  $x$*
- In 11.1: *catenary*
- In 12.1: *regular in codimension  $k$ ,  $(R_k)$ ,  $(S_k)$*
- In 13.1: *Japanese, universally Japanese, Nagata*
- In 14.1: *regular locus, singular locus*
- In 15.1: *unibranch at  $x$ , geometrically unibranch at  $x$ , unibranch, geometrically unibranch*
- In 15.4: *number of branches of  $X$  at  $x$ , number of geometric branches of  $X$  at  $x$*
- In 18.1: *quasi-affine*
- In 21.1: *locally projective*
- In 23.1:  *$\kappa$ -generated*
- In 24.3: *subsheaf of sections annihilated by  $\mathcal{I}$*
- In 24.6: *subsheaf of sections supported on  $T$*
- In 26.1: *ample*
- In 9.1: *surjective*
- In 10.1: *universally injective, radicial*
- In 11.1: *affine*
- In 12.1: *ample family of invertible modules on  $X$*
- In 13.1: *quasi-affine*
- In 14.1: *local, stable under base change, stable under composition*
- In 14.2: *locally of type  $P$*
- In 15.1: *finite type at  $x \in X$ , locally of finite type, finite type*
- In 16.3: *finite type point*
- In 17.1: *universally catenary*
- In 19.1:  *$J$ -2*
- In 20.1: *quasi-finite at a point  $x \in X$ , locally quasi-finite, quasi-finite*
- In 21.1: *finite presentation at  $x \in X$ , locally of finite presentation, finite presentation*
- In 23.1: *open, universally open*
- In 24.1: *submersive, universally submersive*
- In 25.1: *flat at a point  $x \in X$ , flat over  $S$  at a point  $x \in X$ , flat, flat over  $S$*
- In 26.3: *canonical scheme structure on  $T$*
- In 29.1: *relative dimension  $\leq d$  at  $x$ , relative dimension  $\leq d$ , relative dimension  $d$*
- In 30.1: *syntomic at  $x \in X$ , syntomic, local complete intersection over  $k$ , standard syntomic*
- In 30.15: *syntomic of relative dimension  $d$*
- In 31.1: *conormal sheaf  $\mathcal{C}_{Z/X}$  of  $Z$  in  $X$ , conormal sheaf of  $i$*
- In 32.1: *sheaf of differentials  $\Omega_{X/S}$  of  $X$  over  $S$ , universal  $S$ -derivation*
- In 34.1: *smooth at  $x \in X$ , smooth, standard smooth*
- In 34.13: *smooth of relative dimension  $d$*
- In 35.1: *unramified at  $x \in X$ ,  $G$ -unramified at  $x \in X$ , unramified,  $G$ -unramified*
- In 36.1: *étale at  $x \in X$ , étale, standard étale*
- In 37.1: *relatively ample,  $f$ -relatively ample, ample on  $X/S$ ,  $f$ -ample*

**Morphisms of Schemes**

- In 4.4: *scheme theoretic intersection, scheme theoretic union*
- In 5.5: *scheme theoretic support of  $\mathcal{F}$*
- In 6.2: *scheme theoretic image*
- In 7.1: *scheme theoretic closure of  $U$  in  $X$ , scheme theoretically dense in  $X$*
- In 8.1: *dominant*

- In 38.1: *relatively very ample,  $f$ -relatively very ample, very ample on  $X/S$ ,  $f$ -very ample*
  - In 40.1: *quasi-projective,  $H$ -quasi-projective, locally quasi-projective*
  - In 41.1: *proper*
  - In 43.1: *projective,  $H$ -projective, locally projective*
  - In 44.1: *integral, finite*
  - In 45.1: *universal homeomorphism*
  - In 47.1: *seminormal, absolutely weakly normal*
  - In 47.3: *seminormal, absolutely weakly normal*
  - In 47.8: *seminormalization, absolute weak normalization*
  - In 48.1: *finite locally free, rank, degree*
  - In 49.1: *equivalent, rational map from  $X$  to  $Y$ ,  $S$ -rational map from  $X$  to  $Y$*
  - In 49.3: *rational function on  $X$*
  - In 49.4: *ring of rational functions on  $X$*
  - In 49.6: *function field, field of rational functions*
  - In 49.8: *defined in a point  $x \in X$ , domain of definition*
  - In 49.10: *dominant*
  - In 49.11: *birational,  $S$ -birational*
  - In 50.1: *birational*
  - In 51.8: *degree of  $X$  over  $Y$*
  - In 51.11: *modification of  $X$*
  - In 51.12: *alteration of  $X$*
  - In 53.2: *integral closure of  $\mathcal{O}_X$  in  $\mathcal{A}$*
  - In 53.3: *normalization of  $X$  in  $Y$*
  - In 54.1: *normalization*
  - In 55.6: *seminormalization of  $X$  in  $Y$ , weak normalization of  $X$  in  $Y$*
  - In 55.8: *weak normalization*
  - In 55.9: *weakly normal*
  - In 57.1: *bounds the degrees of the fibres of  $f$ , fibres of  $f$  are universally bounded*
- Cohomology of Schemes**
- In 11.1: *depth  $k$  at a point, depth  $k$  at a point,  $(S_k)$ ,  $(S_k)$*
  - In 11.4: *Cohen-Macaulay*
  - In 26.2:  *$Z$  is proper over  $S$*
- Divisors**
- In 2.1: *associated, associated points of  $X$*
  - In 4.1: *embedded associated point, embedded point, embedded component*
  - In 5.1: *weakly associated, weakly associated points of  $X$*
  - In 7.1: *relative assassin of  $\mathcal{F}$  in  $X$  over  $S$*
  - In 8.1: *relative weak assassin of  $\mathcal{F}$  in  $X$  over  $S$*
  - In 11.2: *torsion, torsion free*
  - In 12.1: *reflexive hull, reflexive*
  - In 13.1: *locally principal closed subscheme, effective Cartier divisor*
  - In 13.6: *sum of the effective Cartier divisors  $D_1$  and  $D_2$*
  - In 13.12: *pullback of  $D$  by  $f$  is defined, pullback of the effective Cartier divisor*
  - In 14.1: *invertible sheaf  $\mathcal{O}_S(D)$  associated to  $D$ , canonical section*
  - In 14.6: *regular section*
  - In 14.8: *zero scheme*
  - In 18.2: *relative effective Cartier divisor*
  - In 19.1: *conormal algebra  $\mathcal{C}_{Z/X,*}$  of  $Z$  in  $X$ , conormal algebra of  $f$*
  - In 19.5: *normal cone  $C_Z X$ , normal bundle*
  - In 20.2: *regular, Koszul-regular,  $H_1$ -regular, quasi-regular*
  - In 21.1: *regular immersion, Koszul-regular immersion,  $H_1$ -regular immersion, quasi-regular immersion*
  - In 22.2: *relative quasi-regular immersion, relative  $H_1$ -regular immersion*
  - In 23.1: *sheaf of meromorphic functions on  $X$ ,  $\mathcal{K}_X$ , meromorphic function*
  - In 23.3: *meromorphic section of  $\mathcal{F}$*
  - In 23.4: *pullbacks of meromorphic functions are defined for  $f$*
  - In 23.7: *regular*
  - In 23.10: *ideal sheaf of denominators of  $s$*
  - In 26.2: *prime divisor, Weil divisor*
  - In 26.3: *order of vanishing of  $f$  along  $Z$*
  - In 26.5: *principal Weil divisor associated to  $f$*
  - In 26.7: *Weil divisor class group*
  - In 27.1: *order of vanishing of  $s$  along  $Z$*
  - In 27.4: *Weil divisor associated to  $s$ , Weil divisor class associated to  $\mathcal{L}$*

In 32.1: *blowing up of  $X$  along  $Z$ , blowing up of  $X$  in the ideal sheaf  $\mathcal{I}$ , exceptional divisor, center*

In 33.1: *strict transform, strict transform*

In 34.1:  *$U$ -admissible blowup*

### Limits of Schemes

#### Varieties

In 3.1: *variety*

In 6.1: *geometrically reduced at  $x$ , geometrically reduced*

In 7.1: *geometrically connected*

In 8.1: *geometrically irreducible*

In 9.1: *geometrically pointwise integral at  $x$ , geometrically pointwise integral, geometrically integral*

In 10.1: *geometrically normal at  $x$ , geometrically normal*

In 12.1: *geometrically regular at  $x$ , geometrically regular over  $k$*

In 16.1: *dual numbers*

In 16.3: *tangent space of  $X$  over  $S$  at  $x$ , tangent vector*

In 20.1: *algebraic  $k$ -scheme, locally algebraic  $k$ -scheme*

In 26.1: *affine variety, projective variety, quasi-projective variety, proper variety, smooth variety*

In 33.1: *Euler characteristic of  $\mathcal{F}$*

In 35.7:  *$m$ -regular*

In 35.15: *Hilbert polynomial*

In 36.1: *absolute Frobenius of  $X$*

In 36.4: *relative Frobenius morphism of  $X/S$*

In 39.3:  *$\delta$ -invariant of  $A$*

In 39.7:  *$\delta$ -invariant of  $X$  at  $x$*

In 40.4:  *$A$  is a wedge of  $A_1, \dots, A_n$*

In 43.1: *curve*

In 44.1: *degree, degree*

In 45.3: *intersection number*

In 45.10: *degree of  $Z$  with respect to  $\mathcal{L}$*

In 46.1: *embedding dimension of  $X$  at  $x$*

In 46.2: *embedding dimension of  $X/k$  at  $x$*

#### Topologies on Schemes

In 3.1: *Zariski covering of  $T$*

In 3.4: *standard Zariski covering*

In 3.5: *big Zariski site*

In 3.7: *big Zariski site of  $S$ , small Zariski site of  $S$ , big affine Zariski site of  $S$ , small affine Zariski site of  $S$*

In 3.15: *restriction to the small Zariski site*

In 4.1: *étale covering of  $T$*

In 4.5: *standard étale covering*

In 4.6: *big étale site*

In 4.8: *big étale site of  $S$ , small étale site of  $S$ , big affine étale site of  $S$ , small affine étale site of  $S$*

In 4.15: *restriction to the small étale site*

In 5.1: *smooth covering of  $T$*

In 5.5: *standard smooth covering*

In 5.6: *big smooth site*

In 5.8: *big smooth site of  $S$ , big affine smooth site of  $S$*

In 6.1: *syntomic covering of  $T$*

In 6.5: *standard syntomic covering*

In 6.6: *big syntomic site*

In 6.8: *big syntomic site of  $S$ , big affine syntomic site of  $S$*

In 7.1: *fppf covering of  $T$*

In 7.5: *standard fppf covering*

In 7.6: *big fppf site*

In 7.8: *big fppf site of  $S$ , big affine fppf site of  $S$*

In 8.1: *standard  $ph$  covering*

In 8.4:  *$ph$  covering of  $T$*

In 8.9: *big  $ph$  site*

In 8.11: *big  $ph$  site of  $S$ , big affine  $ph$  site of  $S$*

In 9.1: *fpqc covering of  $T$*

In 9.9: *standard fpqc covering*

In 9.12: *satisfies the sheaf property for the given family, satisfies the sheaf property for the fpqc topology*

In 10.1: *standard  $V$  covering*

In 10.7:  *$V$  covering of  $T$*

In 10.11: *satisfies the sheaf property for the  $V$  topology*

#### Descent

In 2.1: *descent datum  $(\mathcal{F}_i, \varphi_{ij})$  for quasi-coherent sheaves, cocycle condition, morphism  $\psi : (\mathcal{F}_i, \varphi_{ij}) \rightarrow (\mathcal{F}'_i, \varphi'_{ij})$  of descent data*

In 2.3: *trivial descent datum, canonical descent datum, effective*  
 In 3.1: *descent datum  $(N, \varphi)$  for modules with respect to  $R \rightarrow A$ , cocycle condition, morphism  $(N, \varphi) \rightarrow (N', \varphi')$  of descent data*  
 In 3.4: *effective*  
 In 4.2: *split equalizer*  
 In 4.5: *universally injective*  
 In 4.9:  *$C$*   
 In 4.15: *base extension along  $f$ , descent morphism for modules, effective descent morphism for modules*  
 In 4.19:  *$f_*$*   
 In 8.2: *structure sheaf of the big site  $(Sch/S)_\tau$ , structure sheaf of the small site, sheaf of  $\mathcal{O}$ -modules associated to  $\mathcal{F}$ , sheaf of  $\mathcal{O}$ -modules associated to  $\mathcal{F}$*   
 In 12.1: *parasitic, parasitic for the  $\tau$ -topology*  
 In 15.1: *local in the  $\tau$ -topology*  
 In 20.1: *germ of  $X$  at  $x$ , morphism of germs, composition of morphisms of germs*  
 In 20.2: *étale, smooth*  
 In 21.1: *étale local, smooth local*  
 In 22.1:  *$\tau$  local on the base,  $\tau$  local on the target, local on the base for the  $\tau$ -topology*  
 In 26.1:  *$\tau$  local on the source, local on the source for the  $\tau$ -topology*  
 In 32.3: *étale local on source-and-target*  
 In 33.1: *étale local on the source-and-target*  
 In 34.1: *descent datum for  $V/X/S$ , cocycle condition, descent datum relative to  $X \rightarrow S$ , morphism  $f : (V/X, \varphi) \rightarrow (V'/X, \varphi')$  of descent data relative to  $X \rightarrow S$*   
 In 34.3: *descent datum  $(V_i, \varphi_{ij})$  relative to the family  $\{X_i \rightarrow S\}$ , morphism  $\psi : (V_i, \varphi_{ij}) \rightarrow (V'_i, \varphi'_{ij})$  of descent data*  
 In 34.7: *pullback functor*  
 In 34.9: *pullback functor*  
 In 34.10: *trivial descent datum, canonical descent datum, effective*  
 In 34.11: *canonical descent datum, effective*

In 36.1: *morphisms of type  $\mathcal{P}$  satisfy descent for  $\tau$ -coverings*

### Derived Categories of Schemes

In 6.1: *supported on  $T$*   
 In 14.1: *approximation holds for the triple*  
 In 14.2: *approximation by perfect complexes holds*  
 In 22.2: *Tor independent over  $S$*   
 In 35.1: *perfect relative to  $S$ ,  $S$ -perfect*  
 In 36.1: *resolution property*  
 In 38.2: *Grothendieck group of  $X$ , Grothendieck group of coherent sheaves on  $X$*

### More on Morphisms

In 2.1: *thickening, first order thickening, morphism of thickenings, thickenings over  $S$ , morphisms of thickenings over  $S$*   
 In 5.1: *first order infinitesimal neighbourhood*  
 In 6.1: *formally unramified*  
 In 7.2: *universal first order thickening, conormal sheaf of  $Z$  over  $X$*   
 In 8.1: *formally étale*  
 In 11.1: *formally smooth*  
 In 13.1: *naive cotangent complex of  $f$*   
 In 20.1: *normal at  $x$ , normal morphism*  
 In 21.1: *regular at  $x$ , regular morphism*  
 In 22.1: *Cohen-Macaulay at  $x$ , Cohen-Macaulay morphism*  
 In 35.1: *étale neighbourhood of  $(S, s)$ , morphism of étale neighbourhoods, elementary étale neighbourhood*  
 In 58.1: *finitely presented relative to  $S$ , of finite presentation relative to  $S$*   
 In 59.2:  *$m$ -pseudo-coherent relative to  $S$ , pseudo-coherent relative to  $S$ ,  $m$ -pseudo-coherent relative to  $S$ , pseudo-coherent relative to  $S$*   
 In 60.2: *pseudo-coherent*  
 In 61.2: *perfect*  
 In 62.2: *Koszul at  $x$ , Koszul morphism, local complete intersection morphism*  
 In 64.1: *weakly étale, absolutely flat*  
 In 66.1: *ind-quasi-affine, ind-quasi-affine*  
 In 73.1: *affine stratification*

In 73.4: *affine stratification number*  
 In 75.2: *weighting, pondération*  
 In 78.1: *completely decomposed, completely decomposed*

**More on Flatness**

In 4.1: *one step dévissage of  $\mathcal{F}/X/S$  over  $s$*   
 In 4.2: *one step dévissage of  $\mathcal{F}/X/S$  at  $x$*   
 In 4.6: *standard shrinking*  
 In 5.1: *complete dévissage of  $\mathcal{F}/X/S$  over  $s$*   
 In 5.2: *complete dévissage of  $\mathcal{F}/X/S$  at  $x$*   
 In 5.5: *standard shrinking*  
 In 6.1: *elementary étale localization of the ring map  $R \rightarrow S$  at  $\mathfrak{q}$*   
 In 6.2: *complete dévissage of  $N/S/R$  over  $\tau$*   
 In 6.4: *complete dévissage of  $N/S/R$  at  $\mathfrak{q}$*   
 In 15.2: *impurity of  $\mathcal{F}$  above  $s$*   
 In 16.1: *pure along  $X_s$ , universally pure along  $X_s$ , pure along  $X_s$ , universally  $S$ -pure, universally pure relative to  $S$ ,  $S$ -pure, pure relative to  $S$ ,  $S$ -pure, pure relative to  $S$*   
 In 20.10:  *$\mathcal{F}$  is flat over  $S$  in dimensions  $\geq n$*   
 In 21.1: *universal flattening of  $\mathcal{F}$  exists, universal flattening of  $X$  exists*  
 In 21.3: *flattening stratification, flattening stratification*  
 In 34.2:  *$h$  covering of  $T$*   
 In 34.10: *big  $h$  site*  
 In 34.11: *standard  $h$  covering*  
 In 34.13: *big  $h$  site of  $S$ , big affine  $h$  site of  $S$*

**Groupoid Schemes**

In 3.1: *pre-relation, relation, pre-equivalence relation, equivalence relation on  $U$  over  $S$*   
 In 3.3: *restriction, pullback*  
 In 4.1: *group scheme over  $S$ , morphism  $\psi : (G, m) \rightarrow (G', m')$  of group schemes over  $S$*

In 4.3: *closed subgroup scheme, open subgroup scheme*  
 In 4.5: *smooth group scheme, flat group scheme, separated group scheme*  
 In 9.1: *abelian variety*  
 In 10.1: *action of  $G$  on the scheme  $X/S$ , equivariant,  $G$ -equivariant*  
 In 10.2: *free*  
 In 11.1: *pseudo  $G$ -torsor, formally principally homogeneous under  $G$ , trivial*  
 In 11.3: *principal homogeneous space,  $G$ -torsor,  $G$ -torsor in the  $\tau$  topology,  $\tau$   $G$ -torsor,  $\tau$  torsor, quasi-isotrivial, locally trivial*  
 In 12.1:  *$G$ -equivariant quasi-coherent  $\mathcal{O}_X$ -module, equivariant quasi-coherent  $\mathcal{O}_X$ -module*  
 In 13.1: *groupoid scheme over  $S$ , groupoid over  $S$ , morphism  $f : (U, R, s, t, c) \rightarrow (U', R', s', t', c')$  of groupoid schemes over  $S$*   
 In 14.1: *quasi-coherent module on  $(U, R, s, t, c)$*   
 In 17.2: *stabilizer of the groupoid scheme  $(U, R, s, t, c)$*   
 In 18.2: *restriction of  $(U, R, s, t, c)$  to  $U'$*   
 In 19.1: *set-theoretically  $R$ -invariant,  $R$ -invariant,  $R$ -invariant,  $R$ -invariant*  
 In 20.1: *quotient sheaf  $U/R$*   
 In 20.2: *representable quotient, representable quotient*  
 In 21.1: *cartesian,  $(U', R', s', t', c')$  is cartesian over  $(U, R, s, t, c)$ , morphism of groupoid schemes cartesian over  $(U, R, s, t, c)$*

**More on Groupoid Schemes**

**Étale Morphisms of Schemes**

In 3.1: *unramified homomorphism of local rings*  
 In 3.5: *unramified at  $x$ , unramified*  
 In 9.1: *flat, faithfully flat, flat (resp. faithfully flat)*  
 In 9.3: *flat over  $Y$  at  $x \in X$ , flat at  $x \in X$ , flat, faithfully flat*  
 In 11.1: *étale homomorphism of local rings*  
 In 11.4: *étale at  $x \in X$ , étale*

In 21.1: *strict normal crossings divisor*  
 In 21.4: *normal crossings divisor*

**Chow Homology and Chern Classes**

In 2.1: *2-periodic complex, cohomology modules, exact, (2,1)-periodic complex, cohomology modules*  
 In 2.2: *multiplicity, (additive) Herbrand quotient*  
 In 7.6:  *$\delta$ -dimension of  $Z$*   
 In 8.1: *cycle on  $X$ ,  $k$ -cycle*  
 In 8.3: *support*  
 In 8.4: *effective*  
 In 9.2: *multiplicity of  $Z'$  in  $Z$ ,  $k$ -cycle associated to  $Z$*   
 In 10.2: *multiplicity of  $Z'$  in  $\mathcal{F}$ ,  $k$ -cycle associated to  $\mathcal{F}$*   
 In 12.1: *pushforward*  
 In 14.1: *flat pullback of  $\alpha$  by  $f$*   
 In 17.1: *principal divisor associated to  $f$*   
 In 19.1: *rationaly equivalent to zero, rationally equivalent, Chow group of  $k$ -cycles on  $X$ , Chow group of  $k$ -cycles modulo rational equivalence on  $X$*   
 In 22.1: *envelope*  
 In 24.1: *Weil divisor associated to  $s$ , Weil divisor associated to  $\mathcal{L}$*   
 In 25.1: *intersection with the first Chern class of  $\mathcal{L}$*   
 In 29.1: *Gysin homomorphism*  
 In 33.1: *bivariant class  $c$  of degree  $p$  for  $f$*   
 In 34.1: *Chow cohomology*  
 In 34.4: *first Chern class*  
 In 37.1: *Chern classes of  $\mathcal{E}$  on  $X$ , total Chern class of  $\mathcal{E}$  on  $X$*   
 In 38.1: *intersection with the  $j$ th Chern class of  $\mathcal{E}$*   
 In 38.8:  *$i$ th Chern class, total Chern class*  
 In 41.1: *degree of a zero cycle*  
 In 46.3: *Chern classes of  $E$  are defined*  
 In 50.3: *localized Chern character, localized  $p$ th Chern class*  
 In 59.4: *the gysin map for  $f$  exists, gysin map*  
 In 68.2: *admissible, symbol, admissible relation, determinant of the finite length  $R$ -module  $M$*   
 In 68.13: *determinant of  $(M, \varphi, \psi)$*

In 68.29: *symbol associated to  $M, a, b$*   
 In 68.31: *tame symbol*

**Intersection Theory**

In 13.5: *intersect properly, intersect properly*  
 In 15.1: *multiplicity of  $M$  for the ideal of definition  $I$*

**Picard Schemes of Curves**

In 4.1: *Picard functor*  
 In 6.3: *genus*

**Weil Cohomology Theories**

In 5.1:  *$i$ th Chow group of  $M$*   
 In 7.3: *classical Weil cohomology theory*  
 In 11.4: *Weil cohomology theory*

**Adequate Modules**

In 3.1: *module-valued functor, morphism of module-valued functors*  
 In 3.2: *adequate, linearly adequate*  
 In 5.1: *adequate*  
 In 5.7:  *$\text{Adeq}(\mathcal{O}), \text{Adeq}((\text{Sch}/S)_\tau, \mathcal{O}), \text{Adeq}(S)$*   
 In 8.1: *pure projective, pure injective*  
 In 8.5: *pure projective resolution, pure injective resolution*  
 In 8.8: *pure extension module*

**Dualizing Complexes**

In 2.1: *essential, essential extension of, essential*  
 In 4.1: *projective cover, projective envelope*  
 In 5.1: *injective hull*  
 In 5.5: *indecomposable*  
 In 15.1: *dualizing complex*  
 In 21.1: *Gorenstein, Gorenstein*  
 In 27.1: *relative dualizing complex*

**Duality for Schemes**

In 2.2: *dualizing complex*  
 In 20.5: *dualizing complex normalized relative to  $\omega_S^\bullet$*   
 In 24.1: *Gorenstein*  
 In 25.2: *Gorenstein at  $x$ , Gorenstein morphism*  
 In 28.1: *relative dualizing complex*

**Discriminants and Differents**

In 4.1: *trace element*

In 7.1: *Kähler different*

In 9.1: *different*

### de Rham Cohomology

In 7.1: *Hodge filtration*

In 15.1: *de Rham complex of log poles is defined for  $Y \subset X$  over  $S$*

In 15.3: *de Rham complex of log poles for  $Y \subset X$  over  $S$*

### Local Cohomology

In 4.2: *cohomological dimension of  $I$  in  $A$*

In 13.1:  *$I$ -depth, depth*

### Algebraic and Formal Geometry

In 6.4: *derived complete with respect to  $\mathcal{I}$*

In 16.5:  *$(\mathcal{F}_n)$  extends to  $X$*

In 16.7:  *$(\mathcal{F}_n)$  canonically extends to  $X$*

In 19.1:  *$(\mathcal{F}_n)$  satisfies the  $(a, b)$ -inequalities,  $(\mathcal{F}_n)$  satisfies the strict  $(a, b)$ -inequalities*

### Algebraic Curves

In 2.7: *nonsingular projective model of  $X$*

In 3.1: *linear series of degree  $d$  and dimension  $r$ ,  $\mathfrak{g}_d^r$*

In 8.1: *genus*

In 11.1: *geometric genus*

In 16.2: *multicross singularity, node, ordinary double point, defines a nodal singularity*

In 19.1: *node, ordinary double point, defines a nodal singularity, singularities of  $X$  are at-worst-nodal*

In 19.10: *split node*

In 20.2: *at-worst-nodal of relative dimension 1*

### Resolution of Surfaces

In 5.1: *normalized blowup of  $X$  at  $x$*

In 8.3: *defines a rational singularity, reduction to rational singularities is possible for  $A$*

In 14.1: *resolution of singularities*

In 14.2: *resolution of singularities by normalized blowups*

### Semistable Reduction

In 3.1: *numerical type*

In 3.2: *equivalent types*

In 3.4: *numerical type of genus  $g$*

In 3.8:  *$(-1)$ -index*

In 3.11: *topological genus of  $T$*

In 3.12: *minimal*

In 3.16:  *$(-2)$ -index*

In 4.1: *Picard group of  $T$*

In 8.4: *minimal model*

In 11.4: *numerical type associated to  $X$*

In 14.6: *semistable reduction*

In 14.8: *good reduction*

### Functors and Morphisms

#### Derived Categories of Varieties

In 3.2: *a Serre functor exists, Serre functor*

In 8.1: *Fourier-Mukai functor, Fourier-Mukai kernel*

In 10.1: *siblings, sibling*

In 12.1: *siblings, sibling*

In 15.1: *the Fourier-Mukai kernel of a relative equivalence from  $X$  to  $Y$  over  $S$*

In 18.1: *derived equivalent*

#### Fundamental Groups of Schemes

In 2.1:  *$G$ -set, discrete  $G$ -set, morphism of  $G$ -sets,  $G$ -Sets*

In 3.6: *Galois category*

In 6.1: *fundamental group, base point*

#### Étale Cohomology

In 4.1: *étale covering*

In 9.1: *presheaf of sets, abelian presheaf*

In 10.1: *family of morphisms with fixed target*

In 10.2: *site, coverings*

In 11.1: *separated presheaf, sheaf*

In 11.4: *category of sheaves of sets, abelian sheaves*

In 13.1: *zeroth Čech cohomology group*

In 15.1: *fpqc covering*

In 15.5: *satisfies the sheaf property for the fpqc topology*

In 16.1: *descent datum, cocycle condition, effective*

In 16.5: *descent datum*

- In 16.6: *effective*
  - In 17.2: *ringed site, quasi-coherent*
  - In 18.1: *Čech complex, Čech cohomology groups*
  - In 18.4: *free abelian presheaf on  $\mathcal{G}$*
  - In 20.1:  *$\tau$ -covering*
  - In 20.2: *big  $\tau$ -site of  $S$ , small  $\tau$ -site of  $S$*
  - In 20.4: *standard  $\tau$ -covering*
  - In 21.1: *étale topos, small étale topos, Zariski topos, small Zariski topos, big  $\tau$ -topos*
  - In 23.1: *constant sheaf*
  - In 23.3: *structure sheaf*
  - In 26.1: *étale*
  - In 26.3: *standard étale*
  - In 27.1: *étale covering*
  - In 27.3: *big étale site over  $S$ , small étale site over  $S$ , big, small Zariski sites*
  - In 29.1: *geometric point, lies over, étale neighborhood, morphism of étale neighborhoods*
  - In 29.6: *stalk*
  - In 31.3: *support of  $\mathcal{F}$ , support of  $\sigma$*
  - In 32.2: *henselian*
  - In 32.6: *strictly henselian*
  - In 33.2: *étale local ring of  $S$  at  $\bar{s}$ , strict henselization of  $\mathcal{O}_{S,s}$ , henselization of  $\mathcal{O}_{S,s}$ , strict henselization of  $S$  at  $\bar{s}$ , henselization of  $S$  at  $s$*
  - In 35.1: *direct image, pushforward*
  - In 35.3: *direct image, pushforward*
  - In 35.4: *higher direct images*
  - In 36.1: *inverse image, pullback*
  - In 51.1: *system  $(\mathcal{F}_i, \varphi_{i'})$  of sheaves on  $(X_i, f_{i'})$*
  - In 56.1: *absolute Galois group, algebraic*
  - In 57.1:  *$G$ -module, discrete  $G$ -module, morphism of  $G$ -modules,  $R$ - $G$ -module, morphism of  $R$ - $G$ -modules*
  - In 57.2: *continuous group cohomology groups, group cohomology groups, Galois cohomology groups, Galois cohomology groups of  $K$  with coefficients in  $M$*
  - In 61.3: *similar, equivalent*
  - In 61.4: *Brauer group*
  - In 64.1: *constant sheaf with value  $E$ , constant sheaf, locally constant, finite locally constant, constant sheaf with value  $A$ , constant sheaf, locally constant, finite locally constant, constant sheaf with value  $M$ , constant sheaf, locally constant*
  - In 66.1: *trace*
  - In 67.5:  *$C_r$ , nontrivial solution*
  - In 67.9: *variety, curve*
  - In 70.1: *extension by zero, extension by zero*
  - In 71.1: *constructible, constructible, constructible*
  - In 76.1:  *$D_c(X_{\text{étale}}, \Lambda)$*
  - In 77.1:  *$D_{\text{ctf}}(X_{\text{étale}}, \Lambda)$*
  - In 93.1: *locally acyclic at  $\bar{x}$  relative to  $K$ , locally acyclic relative to  $K$ , universally locally acyclic relative to  $K$ , locally acyclic, universally locally acyclic*
  - In 95.1: *cohomological dimension of  $X$*
  - In 96.1: *cohomological dimension of  $f$*
- Crystalline Cohomology**
- In 2.2: *divided power envelope of  $J$  in  $B$  relative to  $(A, I, \gamma)$*
  - In 4.1:  *$\delta$  is compatible with  $\gamma$*
  - In 5.2: *divided power thickening, homomorphism of divided power thickenings*
  - In 6.1: *divided power  $A$ -derivation*
  - In 7.1: *divided power structure  $\gamma$*
  - In 7.2: *divided power scheme, morphism of divided power schemes*
  - In 7.3: *divided power thickening*
  - In 8.1: *divided power thickening of  $X$  relative to  $(S, \mathcal{I}, \gamma)$ , morphism of divided power thickenings of  $X$  relative to  $(S, \mathcal{I}, \gamma)$*
  - In 8.4: *Zariski, étale, smooth, syntomic, or fppf covering, big crystalline site*
  - In 9.1: *crystalline site*
  - In 11.1: *locally quasi-coherent, quasi-coherent, crystal in  $\mathcal{O}_{X/S}$ -modules*
  - In 11.3: *crystal in quasi-coherent modules, crystal in finite locally free modules*
  - In 12.1:  *$S$ -derivation  $D : \mathcal{O}_{X/S} \rightarrow \mathcal{F}$*
  - In 26.2:  *$F$ -crystal on  $X/S$  (relative to  $\sigma$ ), nondegenerate*
- Pro-étale Cohomology**
- In 2.3:  *$w$ -local,  $w$ -local*
  - In 3.1: *local isomorphism, identifies local rings*

In 4.1: *ind-Zariski*  
 In 7.1: *ind-étale*  
 In 11.1: *w-contractible*  
 In 12.1: *pro-étale covering of  $T$*   
 In 12.6: *standard pro-étale covering*  
 In 12.7: *big pro-étale site*  
 In 12.8: *big pro-étale site of  $S$ , small pro-étale site of  $S$ , big affine pro-étale site of  $S$*   
 In 12.14: *restriction to the small pro-étale site*  
 In 26.1: *extension by zero, extension by zero*  
 In 27.1: *constructible*  
 In 28.1: *constructible  $\Lambda$ -sheaf, lisse, adic lisse, adic constructible*  
 In 29.1: *constructible*  
 In 29.4: *adic lisse, adic constructible*

**Relative Cycles**

In 6.1: *relative  $r$ -cycle on  $X/S$*   
 In 7.1: *equidimensional*  
 In 8.1: *effective*  
 In 9.1: *proper relative cycle*

**More Étale Cohomology**

In 3.3: *direct image with compact support*  
 In 3.7: *sections with compact support*  
 In 4.4: *direct image with compact support*  
 In 12.1: *cohomology of  $K$  with compact support, compactly supported cohomology of  $K$*

**The Trace Formula**

In 3.4: *geometric frobenius*  
 In 3.8: *arithmetic frobenius*  
 In 3.10: *geometric frobenius*  
 In 4.1: *trace*  
 In 6.4: *total right derived functor of  $F$ , total left derived functor of  $G$*   
 In 7.1: *filtered injective, projective, filtered quasi-isomorphism*  
 In 8.1: *filtered derived functor*  
 In 10.1: *perfect*  
 In 12.1: *finite Tor-dimension*  
 In 14.1: *global Lefschetz number*  
 In 14.2: *local Lefschetz number*  
 In 15.2:  *$G$ -trace of  $f$  on  $P$*

In 18.1:  *$\mathbf{Z}_\ell$ -sheaf,  $\ell$ -adic sheaf, lisse, morphism*  
 In 18.6: *torsion, stalk*  
 In 18.8:  *$\ell$ -adic cohomology*  
 In 19.1:  *$L$ -function of  $\mathcal{F}$*   
 In 19.3:  *$L$ -function of  $\mathcal{F}$*   
 In 27.1: *open*  
 In 31.1: *unramified cusp form on  $GL_2(\mathbf{A})$  with values in  $\Lambda$*

**Algebraic Spaces**

In 5.1: *property  $\mathcal{P}$*   
 In 6.1: *algebraic space over  $S$*   
 In 6.3: *morphism  $f : F \rightarrow F'$  of algebraic spaces over  $S$*   
 In 9.2: *étale equivalence relation*  
 In 9.3: *presentation*  
 In 12.1: *open immersion, open subspace, closed immersion, closed subspace, immersion, locally closed subspace*  
 In 12.5: *Zariski covering*  
 In 12.6: *small Zariski site  $F_{Zar}$*   
 In 13.2: *separated over  $S$ , locally separated over  $S$ , quasi-separated over  $S$ , Zariski locally quasi-separated over  $S$*   
 In 14.4: *acts freely, quotient of  $U$  by  $G$*   
 In 16.2: *base change of  $F'$  to  $S$ , viewed as an algebraic space over  $S'$*

**Properties of Algebraic Spaces**

In 3.1: *separated, locally separated, quasi-separated, Zariski locally quasi-separated, separated, locally separated, quasi-separated, Zariski locally quasi-separated*  
 In 4.1: *point*  
 In 4.7: *topological space*  
 In 5.1: *quasi-compact*  
 In 7.2: *has property  $\mathcal{P}$*   
 In 7.5: *has property  $\mathcal{P}$  at  $x$*   
 In 8.2: *étale locally constructible*  
 In 9.1: *dimension of  $X$  at  $x$*   
 In 9.2: *dimension*  
 In 10.2: *dimension of the local ring of  $X$  at  $x$ ,  $x$  is a point of codimension  $d$  on  $X$*   
 In 12.5: *algebraic space structure on  $Z$ , reduced induced algebraic space structure, reduction  $X_{red}$  of  $X$*   
 In 16.2: *étale*

- In 18.1: *small étale site  $X_{\text{étale}}$*
  - In 18.2:  *$X_{\text{spaces,étale}}$*
  - In 18.5:  *$X_{\text{affine,étale}}$*
  - In 18.7: *étale topos, small étale topos*
  - In 18.9:  *$f$ -map  $\varphi : \mathcal{G} \rightarrow \mathcal{F}$*
  - In 19.1: *geometric point, geometric point lying over  $x$*
  - In 19.2: *étale neighborhood, morphism of étale neighborhoods*
  - In 19.6: *stalk*
  - In 20.3: *support of  $\mathcal{F}$ , support of  $\sigma$*
  - In 21.2: *structure sheaf*
  - In 22.2: *étale local ring of  $X$  at  $\bar{x}$ , strict henselization of  $X$  at  $\bar{x}$*
  - In 23.2: *geometrically unibranch at  $x$ , geometrically unibranch*
  - In 23.4: *number of geometric branches of  $X$  at  $x$*
  - In 24.1: *Noetherian*
  - In 25.2:  *$X$  is regular at  $x$*
  - In 29.1: *quasi-coherent*
  - In 31.2: *locally projective*
  - In 23.1: *locally of finite type, finite type at  $x$ , of finite type*
  - In 25.2: *finite type point*
  - In 27.1: *locally quasi-finite, quasi-finite at  $x$ , quasi-finite*
  - In 28.1: *locally of finite presentation, finite presentation at  $x$ , of finite presentation*
  - In 30.1: *flat, flat at  $x$*
  - In 31.2: *flat at  $x$  over  $Y$ , flat over  $Y$*
  - In 33.1: *dimension of the local ring of the fibre of  $f$  at  $x$ , transcendence degree of  $x/f(x)$ ,  $f$  has relative dimension  $d$  at  $x$*
  - In 33.2: *relative dimension  $\leq d$ , relative dimension  $d$*
  - In 36.1: *syntomic, syntomic at  $x$*
  - In 37.1: *smooth, smooth at  $x$*
  - In 38.1: *unramified, unramified at  $x$ ,  $G$ -unramified,  $G$ -unramified at  $x$*
  - In 39.1: *étale at  $x$*
  - In 40.1: *proper*
  - In 41.1: *satisfies the uniqueness part of the valuative criterion, satisfies the existence part of the valuative criterion, satisfies the valuative criterion*
  - In 45.2: *integral, finite*
  - In 46.2: *finite locally free, rank, degree*
  - In 47.1: *equivalent, rational map from  $X$  to  $Y$ ,  $B$ -rational map from  $X$  to  $Y$*
  - In 47.2: *rational function on  $X$*
  - In 47.3: *ring of rational functions on  $X$*
  - In 47.4: *defined in a point  $x \in |X|$ , domain of definition*
  - In 47.6: *dominant*
  - In 47.7: *birational*
  - In 48.2: *integral closure of  $\mathcal{O}_X$  in  $\mathcal{A}$*
  - In 48.3: *normalization of  $X$  in  $Y$*
  - In 49.6: *normalization*
  - In 53.2: *universal homeomorphism*
- Morphisms of Algebraic Spaces**
- In 4.2: *separated, locally separated, quasi-separated*
  - In 5.2: *surjective*
  - In 6.2: *open, universally open*
  - In 7.2: *submersive, universally submersive*
  - In 8.2: *quasi-compact*
  - In 9.2: *closed, universally closed*
  - In 10.1: *monomorphism*
  - In 13.2: *inverse image  $f^{-1}(Z)$  of the closed subspace  $Z$*
  - In 14.4: *scheme theoretic intersection, scheme theoretic union*
  - In 15.4: *scheme theoretic support of  $\mathcal{F}$*
  - In 16.2: *scheme theoretic image*
  - In 17.3: *scheme theoretic closure of  $U$  in  $X$ , scheme theoretically dense in  $X$*
  - In 18.1: *dominant*
  - In 19.3: *universally injective*
  - In 20.2: *affine*
  - In 20.8: *relative spectrum of  $\mathcal{A}$  over  $X$ , spectrum of  $\mathcal{A}$  over  $X$*
  - In 21.2: *quasi-affine*
  - In 22.2: *has property  $\mathcal{P}$*
  - In 22.6: *has property  $\mathcal{Q}$  at  $x$*
- Decent Algebraic Spaces**
- In 3.1: *fibres of  $f$  are universally bounded*
  - In 6.1: *decent, reasonable, very reasonable*
  - In 11.2: *residue field of  $X$  at  $x$*
  - In 11.5: *elementary étale neighbourhood, morphism of elementary étale neighbourhoods*

In 11.7: *henselian local ring of  $X$  at  $x$*   
 In 13.6: *residual space of  $X$  at  $x$*   
 In 17.1: *has property  $(\beta)$ , has property  $(\beta)$ , decent, reasonable, very reasonable*  
 In 22.1: *birational*  
 In 24.2: *unibranch at  $x$ , unibranch*  
 In 24.4: *number of branches of  $X$  at  $x$*   
 In 25.1: *catenary*  
 In 25.4: *universally catenary*

### Cohomology of Algebraic Spaces

In 6.2: *alternating Čech complex*  
 In 12.1: *coherent*

### Limits of Algebraic Spaces

In 3.1: *limit preserving, locally of finite presentation, locally of finite presentation over  $S$ , limit preserving, locally of finite presentation, relatively limit preserving*  
 In 14.3: *subsheaf of sections annihilated by  $\mathcal{I}$*   
 In 14.6: *subsheaf of sections supported on  $T$*

### Divisors on Algebraic Spaces

In 2.2: *weakly associated, weakly associated points of  $X$ ,  $x$  is associated to  $\mathcal{F}$ ,  $x$  is an associated point of  $X$*   
 In 4.2: *the fibre of  $f$  over  $y$  is locally Noetherian, the fibres of  $f$  are locally Noetherian*  
 In 4.5: *relative weak assassin of  $\mathcal{F}$  in  $X$  over  $Y$*   
 In 6.1: *locally principal closed subspace, effective Cartier divisor*  
 In 6.6: *sum of the effective Cartier divisors  $D_1$  and  $D_2$*   
 In 6.10: *pullback of  $D$  by  $f$  is defined, pullback of the effective Cartier divisor*  
 In 7.1: *invertible sheaf  $\mathcal{O}_X(D)$  associated to  $D$*   
 In 7.4: *regular section*  
 In 7.6: *zero scheme*  
 In 9.2: *relative effective Cartier divisor*  
 In 10.1: *sheaf of meromorphic functions on  $X$ ,  $\mathcal{K}_X$ , meromorphic function*  
 In 10.3: *meromorphic section of  $\mathcal{F}$*

In 10.6: *pullbacks of meromorphic functions are defined for  $f$*   
 In 10.9: *regular*  
 In 11.3: *relative homogeneous spectrum of  $\mathcal{A}$  over  $X$ , homogeneous spectrum of  $\mathcal{A}$  over  $X$ , relative Proj of  $\mathcal{A}$  over  $X$*   
 In 14.1: *relatively ample,  $f$ -relatively ample, ample on  $X/Y$ ,  $f$ -ample*  
 In 17.1: *blowing up of  $X$  along  $Z$ , blowing up of  $X$  in the ideal sheaf  $\mathcal{I}$ , exceptional divisor, center*  
 In 18.1: *strict transform, strict transform*  
 In 19.1:  *$U$ -admissible blowup*

### Algebraic Spaces over Fields

In 4.1: *integral*  
 In 4.3: *function field, field of rational functions*  
 In 5.2: *degree of  $X$  over  $Y$*   
 In 6.2: *prime divisor, Weil divisor*  
 In 6.4: *order of vanishing of  $f$  along  $Z$*   
 In 6.7: *principal Weil divisor associated to  $f$*   
 In 6.9: *Weil divisor class group*  
 In 7.1: *order of vanishing of  $s$  along  $Z$*   
 In 7.4: *Weil divisor associated to  $s$ , Weil divisor class associated to  $\mathcal{L}$*   
 In 8.1: *modification of  $X$*   
 In 8.3: *alteration of  $X$*   
 In 11.1: *geometrically reduced at  $x$ , geometrically reduced*  
 In 12.1: *geometrically connected*  
 In 13.1: *geometrically irreducible*  
 In 14.1: *geometrically integral*  
 In 17.1: *Euler characteristic of  $\mathcal{F}$*   
 In 18.3: *intersection number*

### Topologies on Algebraic Spaces

In 3.1: *Zariski covering of  $X$*   
 In 4.1: *étale covering of  $X$*   
 In 4.5:  *$(\text{Spaces}/S)_{\text{étale}}$*   
 In 4.6:  *$(\text{Spaces}/X)_{\text{étale}}$*   
 In 4.9: *restriction to the small étale site*  
 In 5.1: *smooth covering of  $X$*   
 In 6.1: *syntomic covering of  $X$*   
 In 7.1: *fppf covering of  $X$*   
 In 7.6:  *$(\text{Spaces}/S)_{\text{fppf}}$*   
 In 7.7:  *$(\text{Spaces}/X)_{\text{fppf}}$*   
 In 8.1: *ph covering of  $X$*

In 8.5:  $(\text{Spaces}/S)_{ph}$

In 8.6:  $(\text{Spaces}/X)_{ph}$

In 9.1: *fpqc covering of  $X$*

### Descent and Algebraic Spaces

In 3.1: *descent datum  $(\mathcal{F}_i, \varphi_{ij})$  for quasi-coherent sheaves, cocycle condition, morphism  $\psi : (\mathcal{F}_i, \varphi_{ij}) \rightarrow (\mathcal{F}'_i, \varphi'_{ij})$  of descent data*

In 3.3: *trivial descent datum, canonical descent datum, effective*

In 10.1:  *$\tau$  local on the base,  $\tau$  local on the target, local on the base for the  $\tau$ -topology*

In 14.1:  *$\tau$  local on the source, local on the source for the  $\tau$ -topology*

In 20.1: *smooth local on source-and-target*

In 21.1: *étale-smooth local on source-and-target*

In 22.1: *descent datum for  $V/Y/X$ , cocycle condition, descent datum relative to  $Y \rightarrow X$ , morphism  $f : (V/Y, \varphi) \rightarrow (V'/Y, \varphi')$  of descent data relative to  $Y \rightarrow X$*

In 22.3: *descent datum  $(V_i, \varphi_{ij})$  relative to the family  $\{X_i \rightarrow X\}$ , morphism  $\psi : (V_i, \varphi_{ij}) \rightarrow (V'_i, \varphi'_{ij})$  of descent data*

In 22.7: *pullback functor*

In 22.9: *pullback functor*

In 22.10: *trivial descent datum, canonical descent datum, effective*

In 22.11: *canonical descent datum, effective*

### Derived Categories of Spaces

In 3.2: *supported on  $T$*

In 5.1: *derived category of  $\mathcal{O}_X$ -modules with quasi-coherent cohomology sheaves*

In 7.2:  *$T$  is proper over  $Y$*

In 9.1: *elementary distinguished square*

In 14.1: *approximation holds for the triple*

In 14.2: *approximation by perfect complexes holds*

In 20.2: *Tor independent over  $B$*

In 28.1: *resolution property*

### More on Morphisms of Spaces

In 3.1: *radicial*

In 5.1: *conormal sheaf  $\mathcal{C}_{Z/X}$  of  $Z$  in  $X$ , conormal sheaf of  $i$*

In 6.1: *conormal algebra  $\mathcal{C}_{Z/X,*}$  of  $Z$  in  $X$ , conormal algebra of  $i$*

In 6.5: *normal cone  $C_Z X$ , normal bundle*

In 7.2: *sheaf of differentials  $\Omega_{X/Y}$  of  $X$  over  $Y$ , universal  $Y$ -derivation*

In 9.1: *thickening, first order thickening, morphism of thickenings, thickenings over  $B$ , morphisms of thickenings over  $B$*

In 12.1: *first order infinitesimal neighbourhood*

In 13.1: *formally smooth, formally étale, formally unramified*

In 14.1: *formally unramified*

In 15.5: *universal first order thickening, conormal sheaf of  $Z$  over  $X$*

In 16.1: *formally étale*

In 19.1: *formally smooth*

In 21.1: *naive cotangent complex of  $f$*

In 23.2: *the restriction of  $\mathcal{F}$  to its fibre over  $z$  is flat at  $x$  over the fibre of  $Y$  over  $z$ , the fibre of  $X$  over  $z$  is flat at  $x$  over the fibre of  $Y$  over  $z$ , the fibre of  $X$  over  $z$  is flat over the fibre of  $Y$  over  $z$*

In 26.2: *Cohen-Macaulay at  $x$ , Cohen-Macaulay morphism*

In 27.2: *Gorenstein at  $x$ , Gorenstein morphism*

In 29.2: *the fibre of  $f : X \rightarrow Y$  at  $y$  is geometrically reduced*

In 44.2: *Koszul-regular immersion,  $H_1$ -regular immersion, quasi-regular immersion*

In 45.3:  *$m$ -pseudo-coherent relative to  $Y$ , pseudo-coherent relative to  $Y$ ,  $m$ -pseudo-coherent relative to  $Y$ , pseudo-coherent relative to  $Y$*

In 46.1: *pseudo-coherent, pseudo-coherent at  $x$*

In 47.1: *perfect, perfect at  $x$*

In 48.1: *Koszul morphism, local complete intersection morphism, Koszul at  $x$*

In 52.1: *perfect relative to  $Y$ ,  $Y$ -perfect*

In 55.1: *at-worst-nodal of relative dimension 1*

### Flatness on Algebraic Spaces

In 2.2: *impurity of  $\mathcal{F}$  above  $y$*   
 In 3.1: *pure above  $y$ , universally pure above  $y$ , pure above  $y$ , universally  $Y$ -pure, universally pure relative to  $Y$ ,  $Y$ -pure, pure relative to  $Y$ ,  $Y$ -pure, pure relative to  $Y$*   
 In 11.1: *universal flattening of  $\mathcal{F}$  exists, universal flattening of  $X$  exists*  
 In 11.3:  *$\mathcal{F}$  is flat over  $Y$  in dimensions  $\geq n$*

### Groupoids in Algebraic Spaces

In 4.1: *pre-relation, relation, pre-equivalence relation, equivalence relation on  $U$  over  $B$*   
 In 4.3: *restriction, pullback*  
 In 5.1: *group algebraic space over  $B$ , morphism  $\psi : (G, m) \rightarrow (G', m')$  of group algebraic spaces over  $B$*   
 In 8.1: *action of  $G$  on the algebraic space  $X/B$ , equivariant,  $G$ -equivariant*  
 In 8.2: *free*  
 In 9.1: *pseudo  $G$ -torsor, formally principally homogeneous under  $G$ , trivial*  
 In 9.3: *principal homogeneous space, principal homogeneous  $G$ -space over  $B$ ,  $G$ -torsor in the  $\tau$  topology,  $\tau$   $G$ -torsor,  $\tau$  torsor, quasi-isotrivial, locally trivial*  
 In 10.1:  *$G$ -equivariant quasi-coherent  $\mathcal{O}_X$ -module, equivariant quasi-coherent  $\mathcal{O}_X$ -module*  
 In 11.1: *groupoid in algebraic spaces over  $B$ , morphism  $f : (U, R, s, t, c) \rightarrow (U', R', s', t', c')$  of groupoids in algebraic spaces over  $B$*   
 In 12.1: *quasi-coherent module on  $(U, R, s, t, c)$*   
 In 16.2: *stabilizer of the groupoid in algebraic spaces  $(U, R, s, t, c)$*   
 In 17.2: *restriction of  $(U, R, s, t, c)$  to  $U'$*   
 In 18.1:  *$R$ -invariant,  $R$ -invariant,  $R$ -invariant*  
 In 19.1: *quotient sheaf  $U/R$*   
 In 19.3: *quotient representable by an algebraic space, representable quotient, representable quotient, quotient representable by an algebraic space*  
 In 20.1: *quotient stack, quotient stack*

### More on Groupoids in Spaces

In 15.1: *strongly split over  $u$ , strong splitting of  $R$  over  $u$ , split over  $u$ , splitting of  $R$  over  $u$ , quasi-split over  $u$ , quasi-splitting of  $R$  over  $u$*

### Bootstrap

In 3.1: *representable by algebraic spaces*  
 In 4.1: *property  $\mathcal{P}$*

### Pushouts of Algebraic Spaces

### Chow Groups of Spaces

In 2.5:  *$\delta$ -dimension of  $T$*   
 In 3.1: *cycle on  $X$ ,  $k$ -cycle*  
 In 4.2:  *$\mathcal{F}$  has length  $d$  at  $x$*   
 In 5.2: *multiplicity of  $Z$  in  $Y$ ,  $k$ -cycle associated to  $Y$*   
 In 6.1: *multiplicity of  $Z$  in  $\mathcal{F}$ ,  $k$ -cycle associated to  $\mathcal{F}$*   
 In 8.1: *pushforward*  
 In 10.1: *flat pullback of  $\alpha$  by  $f$*   
 In 13.1: *principal divisor associated to  $f$*   
 In 15.1: *rationally equivalent to zero, rationally equivalent, Chow group of  $k$ -cycles on  $X$ , Chow group of  $k$ -cycles modulo rational equivalence on  $X$*   
 In 17.1: *Weil divisor associated to  $s$ , Weil divisor associated to  $\mathcal{L}$*   
 In 18.1: *intersection with the first Chern class of  $\mathcal{L}$*   
 In 22.1: *Gysin homomorphism*  
 In 26.1: *bivariant class  $c$  of degree  $p$  for  $f$*   
 In 26.2: *Chow cohomology*  
 In 28.2:  *$i$ th Chern class of  $\mathcal{E}$ , total Chern class of  $\mathcal{E}$*   
 In 32.1: *degree of a zero cycle*

### Quotients of Groupoids

In 3.1:  *$R$ -invariant,  $G$ -invariant*  
 In 3.4: *base change, flat base change*  
 In 4.1: *categorical quotient, categorical quotient in  $\mathcal{C}$ , categorical quotient in the category of schemes, categorical quotient in schemes*  
 In 4.4: *universal categorical quotient, uniform categorical quotient*  
 In 5.1: *orbit,  $R$ -orbit*

In 5.4: *weakly R-equivalent, R-equivalent, weak orbit, weak R-orbit, orbit, R-orbit*  
 In 5.8: *set-theoretically R-invariant, separates orbits, separates R-orbits*  
 In 5.13: *set-theoretic pre-equivalence relation, set-theoretic equivalence relation*  
 In 5.18: *orbit space for R*  
 In 6.1: *coarse quotient, coarse quotient in schemes*  
 In 7.1: *uniformly, universally*  
 In 8.1: *sheaf of R-invariant functions on X, the functions on X are the R-invariant functions on U*  
 In 9.1: *good quotient*  
 In 10.1: *geometric quotient*

### More on Cohomology of Spaces

#### Simplicial Spaces

In 12.1: *cartesian, cartesian, cartesian, cartesian*  
 In 13.1: *simplicial system of the derived category, cartesian, morphism of simplicial systems of the derived category*  
 In 14.1: *simplicial system of the derived category of modules, cartesian, morphism of simplicial systems of the derived category of modules*  
 In 27.1: *cartesian, Y is cartesian over X*  
 In 27.3: *simplicial scheme associated to f*

#### Duality for Spaces

In 2.2: *dualizing complex*  
 In 9.1: *relative dualizing complex*

#### Formal Algebraic Spaces

In 4.7: *tensor product, completed tensor product*  
 In 4.8: *topologically nilpotent, weak ideal of definition, weakly pre-admissible, weakly admissible*  
 In 5.1: *taut*  
 In 6.1: *adic*  
 In 7.1: *weakly pre-adic, c-adic, weakly adic*  
 In 9.1: *affine formal algebraic space, morphism of affine formal algebraic spaces*

In 9.7: *McQuillan, classical, weakly adic, adic, adic\*, Noetherian*  
 In 9.9: *formal spectrum*  
 In 10.2: *countably indexed*  
 In 11.1: *formal algebraic space, morphism of formal algebraic spaces*  
 In 14.3: *completion of X along T*  
 In 16.3: *quasi-separated, separated*  
 In 17.2: *quasi-compact*  
 In 17.4: *quasi-compact*  
 In 20.7: *locally countably indexed, locally countably indexed and classical, locally weakly adic, locally adic\*, locally Noetherian*  
 In 23.2: *adic morphism*  
 In 24.1: *locally of finite type, finite type*  
 In 25.1: *surjective*  
 In 26.1: *monomorphism*  
 In 27.1: *closed immersion*  
 In 29.1: *topologically of finite type over*  
 In 30.1: *separated, quasi-separated*  
 In 31.1: *proper*  
 In 34.1: *small étale site*  
 In 37.3: *completion of X along T*  
 In 38.1: *completion of X along Z*

#### Algebraization of Formal Spaces

In 4.1: *rig-smooth over (A, I)*  
 In 8.1: *rig-étale over (A, I)*  
 In 13.4: *flat*  
 In 14.2: *rig-closed*  
 In 14.7: *completed principal localization*  
 In 15.2: *naively rig-flat*  
 In 15.4: *rig-flat*  
 In 16.1: *rig-flat*  
 In 17.2: *rig-smooth*  
 In 18.1: *rig-smooth*  
 In 19.2: *rig-étale*  
 In 20.1: *rig-étale*  
 In 21.1: *rig-surjective*  
 In 24.1: *formal modification*

#### Resolution of Surfaces Revisited

In 4.1: *blowing up  $X' \rightarrow X$  of X at x*  
 In 5.1: *normalized blowup of X at x*  
 In 8.1: *resolution of singularities*  
 In 8.2: *resolution of singularities by normalized blowups*

#### Formal Deformation Theory

- In 3.1:  $\mathcal{C}_\Lambda$ , classical case
  - In 3.2: small extension
  - In 3.6: relative cotangent space
  - In 3.9: essential surjection
  - In 4.1:  $\widehat{\mathcal{C}}_\Lambda$
  - In 5.1: category cofibered in groupoids over  $\mathcal{C}$
  - In 6.1: prorepresentable
  - In 6.2: predeformation category, morphism of predeformation categories
  - In 7.1: category  $\widehat{\mathcal{F}}$  of formal objects of  $\mathcal{F}$ , formal object  $\xi = (R, \xi_n, f_n)$  of  $\mathcal{F}$ , morphism  $a : \xi \rightarrow \eta$  of formal objects
  - In 7.3: completion of  $\mathcal{F}$
  - In 8.1: smooth
  - In 8.9: versal
  - In 9.1: smooth, unobstructed
  - In 10.1: conditions (S1) and (S2)
  - In 11.1:  $R$ -linear
  - In 11.9: tangent space  $TF$  of  $F$
  - In 12.1: tangent space  $T\mathcal{F}$  of  $\mathcal{F}$
  - In 12.3: differential  $d\varphi : T\mathcal{F} \rightarrow T\mathcal{G}$  of  $\varphi$
  - In 14.4: minimal, miniversal
  - In 16.1: condition (RS)
  - In 16.8: deformation category
  - In 17.1: lift of  $x$  along  $f$ , morphism of lifts
  - In 19.1: group of infinitesimal automorphisms of  $x'$  over  $x$
  - In 19.2: group of infinitesimal automorphisms of  $x_0$
  - In 19.5: automorphism functor of  $x$
  - In 21.1: category of groupoids in functors on  $\mathcal{C}$ , groupoid in functors on  $\mathcal{C}$ , morphism  $(U, R, s, t, c) \rightarrow (U', R', s', t', c')$  of groupoids in functors on  $\mathcal{C}$
  - In 21.4: representable
  - In 21.7: restriction  $(U, R, s, t, c)|_{\mathcal{C}'}$  of  $(U, R, s, t, c)$  to  $\mathcal{C}'$
  - In 21.9: quotient category cofibered in groupoids  $[U/R] \rightarrow \mathcal{C}$ , quotient morphism  $U \rightarrow [U/R]$
  - In 22.1: prorepresentable
  - In 22.2: completion  $(U, R, s, t, c)^\wedge$  of  $(U, R, s, t, c)$
  - In 23.1: smooth
  - In 25.1: presentation of  $\mathcal{F}$  by  $(U, R, s, t, c)$
  - In 27.1: normalized, minimal
- Deformation Theory**
- In 3.2: strict morphism of thickenings
  - In 9.2: strict morphism of thickenings
- The Cotangent Complex**
- In 3.1: standard resolution of  $B$  over  $A$
  - In 3.2: cotangent complex
  - In 13.1:  $A$ -biderivation
  - In 17.1: Atiyah class
  - In 18.1: standard resolution of  $\mathcal{B}$  over  $\mathcal{A}$
  - In 18.2: cotangent complex
  - In 19.1: Atiyah class
  - In 20.1: cotangent complex
  - In 22.1: cotangent complex
  - In 24.1: cotangent complex  $L_{X/Y}$  of  $X$  over  $Y$
  - In 26.1: cotangent complex  $L_{X/Y}$  of  $X$  over  $Y$
- Deformation Problems**
- Algebraic Stacks**
- In 8.1: representable by an algebraic space over  $S$
  - In 9.1: representable by algebraic spaces
  - In 10.1: property  $\mathcal{P}$
  - In 12.1: algebraic stack over  $S$
  - In 12.2: Deligne-Mumford stack
  - In 12.3: 2-category of algebraic stacks over  $S$
  - In 16.4: smooth groupoid
  - In 16.5: presentation
  - In 19.2: viewed as an algebraic stack over  $S'$
  - In 19.3: change of base of  $\mathcal{X}'$
- Examples of Stacks**
- In 18.2: degree  $d$  finite Hilbert stack of  $\mathcal{X}$  over  $\mathcal{Y}$
- Sheaves on Algebraic Stacks**
- In 3.1: presheaf on  $\mathcal{X}$ , morphism of presheaves on  $\mathcal{X}$
  - In 4.1: associated Zariski site, associated étale site, associated smooth site, associated syntomic site, associated fppf site
  - In 4.3: Zariski sheaf, sheaf for the Zariski topology, étale sheaf, sheaf for the étale

*topology, smooth sheaf, sheaf for the smooth topology, syntomic sheaf, sheaf for the syntomic topology, fppf sheaf, sheaf, sheaf for the fppf topology*

In 4.5: *associated morphism of fppf topoi*

In 6.1: *structure sheaf of  $\mathcal{X}$*

In 7.1: *presheaf of modules on  $\mathcal{X}$ ,  $\mathcal{O}_{\mathcal{X}}$ -module, sheaf of  $\mathcal{O}_{\mathcal{X}}$ -modules*

In 9.2: *pullback  $x^{-1}\mathcal{F}$  of  $\mathcal{F}$ , restriction of  $\mathcal{F}$  to  $U_{\text{étale}}$*

In 11.1: *quasi-coherent module on  $\mathcal{X}$ , quasi-coherent  $\mathcal{O}_{\mathcal{X}}$ -module*

In 12.1: *locally quasi-coherent*

In 24.1: *associated affine site*

In 24.2: *associated affine Zariski site, associated affine étale site, associated affine smooth site, associated affine syntomic site, associated affine fppf site*

In 26.1: *triangulated category of quasi-coherent objects in the derived category*

### Criteria for Representability

In 8.1: *algebraic*

### Artin's Axioms

In 5.1: *condition (RS)*

In 9.1: *formal object, morphism of formal objects, lies over*

In 9.4: *effective*

In 11.1: *limit preserving*

In 12.1: *versal*

In 12.2: *versal*

In 13.1: *openness of versality, openness of versality*

In 18.1: *condition (RS\*)*

In 22.1: *obstruction theory, obstruction modules, obstruction*

In 23.5: *naive obstruction theory*

### Quot and Hilbert Spaces

### Properties of Algebraic Stacks

In 4.2: *point*

In 4.8: *topological space*

In 5.1: *surjective*

In 6.1: *quasi-compact*

In 7.2: *has property  $\mathcal{P}$*

In 7.5: *has property  $\mathcal{P}$  at  $x$*

In 8.1: *monomorphism*

In 9.1: *open immersion, closed immersion, immersion*

In 9.9: *open substack, closed substack, locally closed substack*

In 10.4: *algebraic stack structure on  $Z$ , reduced induced algebraic stack structure, reduction  $\mathcal{X}_{\text{red}}$  of  $\mathcal{X}$*

In 11.8: *residual gerbe of  $\mathcal{X}$  at  $x$  exists, residual gerbe of  $\mathcal{X}$  at  $x$*

In 12.2: *dimension of  $\mathcal{X}$  at  $x$*

In 12.3: *dimension*

In 13.1: *number of geometric branches of  $\mathcal{X}$  at  $x$ , geometrically unibranch at  $x$*

### Morphisms of Algebraic Stacks

In 4.1: *DM, quasi-DM, separated, quasi-separated*

In 4.2: *DM over  $S$ , quasi-DM over  $S$ , separated over  $S$ , quasi-separated over  $S$ , DM, quasi-DM, separated, quasi-separated*

In 5.3: *relative sheaf of automorphisms of  $x$ , relative sheaf of isomorphisms from  $x_1$  to  $x_2$ , sheaf of automorphisms of  $x$ , sheaf of isomorphisms from  $x_1$  to  $x_2$*

In 7.2: *quasi-compact*

In 8.1: *Noetherian*

In 9.1: *affine*

In 10.1: *integral, finite*

In 11.2: *open, universally open*

In 12.2: *submersive, universally submersive*

In 13.2: *closed, universally closed*

In 14.2: *universally injective*

In 15.2: *universal homeomorphism*

In 16.2: *has property  $\mathcal{P}$*

In 17.1: *locally of finite type, of finite type*

In 18.2: *finite type point*

In 23.2: *locally quasi-finite*

In 24.1: *quasi-finite*

In 25.1: *flat*

In 26.2: *flat at  $x$*

In 27.1: *locally of finite presentation, of finite presentation*

In 28.1: *gerbe over, gerbe*

In 33.1: *smooth*

In 34.2: *has property  $\mathcal{P}$*

In 35.1: *étale*

In 36.1: *unramified*

- In 37.1: *proper*
- In 38.1: *scheme theoretic image*
- In 39.1: *dotted arrow, morphism of dotted arrows*
- In 39.6: *uniqueness part of the valuative criterion*
- In 39.10: *existence part of the valuative criterion*
- In 44.1: *local complete intersection morphism, Koszul*
- In 46.3: *normalization*
- In 48.1: *decent*
- In 50.1: *integral*
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- In 3.1: *limit preserving*
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- In 7.1: *flat base change property*
- In 9.1: *parasitic*
- In 14.1: *lisse-étale site, flat-fppf site*
- In 17.2: *coherent*
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- In 5.1: *derived category of  $\mathcal{O}_X$ -modules with quasi-coherent cohomology sheaves*
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- In 4.3: *smooth*
- In 5.1: *algebraic stack*
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- In 3.1: *thickening, morphism of thickenings, thickenings over  $\mathcal{Z}$ , morphisms of thickenings over  $\mathcal{Z}$*
- In 3.3: *first order thickening*
- In 8.1: *formally smooth*
- In 12.1: *categorical moduli space, uniform categorical moduli space, categorical moduli space in  $\mathcal{C}$ , uniform categorical moduli space in  $\mathcal{C}$*
- In 13.1: *well-nigh affine*
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- In 2.2: *versal ring to  $\mathcal{X}$  at  $x_0$*
- In 3.4: *multiplicity*
- In 4.1: *formal branches of  $\mathcal{X}$  through  $x_0$*
- In 4.3: *multiplicity of a formal branch of  $\mathcal{X}$  through  $x_0$*
- In 5.2: *the relative dimension*
- In 5.7: *relative dimension*
- In 5.14: *pseudo-catenary*
- In 6.3: *dimension of the local ring of  $\mathcal{X}$  at  $x$*
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- Moduli of Curves**
- In 16.4: *moduli stack of smooth proper curves, moduli stack of smooth proper curves of genus  $g$*
- In 19.2: *relative dualizing sheaf*
- In 20.1: *prestable family of curves*
- In 21.2: *semistable family of curves*
- In 22.2: *stable family of curves*
- In 22.4: *moduli stack of stable curves, moduli stack of stable curves of genus  $g$*
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- In 2.1: *directed set, system of rings*
- In 2.3: *colimit*
- In 2.8: *finite presentation*
- In 6.4: *quasi-compact*
- In 6.6: *Hausdorff*
- In 6.9: *irreducible, irreducible*
- In 6.12: *generic point*
- In 6.16: *Noetherian, Artinian*
- In 6.18: *irreducible component*
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- In 6.26: *connected, connected component*
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- In 26.1: *numerical polynomial*
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