

# AUTO GENERATED INDEX

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### 1. Alphabetized definitions

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- Weil divisor  $[D]$  associated to an effective Cartier divisor  $D \subset X$*  in 48.1

<i>Weil divisor associated to <math>\mathcal{L}</math></i> in 22.1	<i>Zariski covering of <math>X</math></i> in 3.1
<i>Weil divisor associated to <math>\mathcal{L}</math></i> in 17.1	<i>Zariski covering</i> in 12.5
<i>Weil divisor associated to <math>s</math></i> in 27.4	<i>Zariski locally quasi-separated over <math>S</math></i> in 13.2
<i>Weil divisor associated to <math>s</math></i> in 22.1	<i>Zariski locally quasi-separated</i> in 3.1
<i>Weil divisor associated to <math>s</math></i> in 7.4	<i>Zariski locally quasi-separated</i> in 3.1
<i>Weil divisor associated to <math>s</math></i> in 17.1	<i>Zariski pair</i> in 10.1
<i>Weil divisor associated to a Cartier divisor</i> in 48.1	<i>Zariski sheaf</i> in 4.3
<i>Weil divisor associated to a rational function <math>f \in K(X)^*</math></i> in 48.1	<i>Zariski topos</i> in 21.1
<i>Weil divisor class associated to <math>\mathcal{L}</math></i> in 27.4	<i>Zariski, étale, smooth, syntomic, or fppf covering</i> in 8.4
<i>Weil divisor class associated to <math>\mathcal{L}</math></i> in 7.4	<i>Zariski</i> in 16.3
<i>Weil divisor class group</i> in 26.7	<i>zero object</i> in 3.3
<i>Weil divisor class group</i> in 6.9	<i>zero scheme</i> in 14.8
<i>Weil divisor</i> in 26.2	<i>zero scheme</i> in 7.6
<i>Weil divisor</i> in 6.2	<i>zeroth <math>K</math>-group of <math>\mathcal{A}</math></i> in 10.1
<i>Weil divisor</i> in 48.1	<i>zeroth Čech cohomology group</i> in 13.1
<i>well-nigh affine</i> in 13.1	<i>Čech cohomology groups</i> in 10.1
<i>which associates a presheaf to a semi-representable object</i> in 2.2	<i>Čech cohomology groups</i> in 9.1
<i>wild inertia group of <math>\mathfrak{m}</math></i> in 96.13	<i>Čech cohomology groups</i> in 18.1
<i>Yoneda extension</i> in 27.4	<i>Čech complex</i> in 10.1
<i>Zariski covering of <math>T</math></i> in 3.1	<i>Čech complex</i> in 9.1
	<i>Čech complex</i> in 18.1

## 2. Definitions listed per chapter

<b>Introduction</b>	In 3.3: <i>presheaf of sets on <math>\mathcal{C}</math>, presheaf</i>
	In 3.6: <i>representable</i>
<b>Conventions</b>	In 4.1: <i>product</i>
	In 4.2: <i>has products of pairs of objects</i>
<b>Set Theory</b>	In 5.1: <i>coproduct, amalgamated sum</i>
	In 5.2: <i>has coproducts of pairs of objects</i>
<b>Categories</b>	In 6.1: <i>fibre product</i>
	In 6.2: <i>cartesian</i>
In 2.1: <i>category</i>	In 6.3: <i>has fibre products</i>
In 2.4: <i>isomorphism</i>	In 6.4: <i>representable</i>
In 2.5: <i>groupoid</i>	In 8.2: <i>representable, <math>F</math> is relatively representable over <math>G</math></i>
In 2.8: <i>functor</i>	In 9.1: <i>pushout</i>
In 2.9: <i>faithful, fully faithful, essentially surjective</i>	In 9.2: <i>cocartesian</i>
In 2.10: <i>subcategory, full subcategory, strictly full</i>	In 10.1: <i>equalizer</i>
In 2.15: <i>natural transformation, morphism of functors</i>	In 11.1: <i>coequalizer</i>
In 2.17: <i>equivalence of categories, quasi-inverse</i>	In 12.1: <i>initial, final</i>
In 2.20: <i>product category</i>	In 13.1: <i>monomorphism, epimorphism</i>
In 3.1: <i>opposite category</i>	In 14.1: <i>limit</i>
In 3.2: <i>contravariant</i>	In 14.2: <i>colimit</i>
	In 14.5: <i>product</i>
	In 14.6: <i>coproduct</i>

- 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: *is 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: *left multiplicative system, right multiplicative system, multiplicative system*
  - In 26.4:  *$s^{-1}f$*
  - In 26.12:  *$fs^{-1}$*
  - In 26.20: *saturated*
  - In 27.1: *horizontal*
  - In 28.1: *2-category, 1-morphisms, 2-morphisms, vertical, composition, horizontal*
  - In 28.2: *sub 2-category*
  - In 28.4: *equivalent*
  - In 28.5: *functor, weak functor, pseudo functor*
  - In 29.1: *(2,1)-category*
  - In 30.1: *final object*
  - In 30.2: *2-fibre product of  $f$  and  $g$*
  - In 31.1: *2-category of categories over  $\mathcal{C}$*
  - In 31.2: *fibre category, lift,  $x$  lies over  $U$ , lift,  $\phi$  lies over  $f$*
  - In 32.1: *strongly cartesian morphism, strongly  $\mathcal{C}$ -cartesian morphism*
  - In 32.5: *fibred category over  $\mathcal{C}$*
  - In 32.6: *choice of pullbacks, pullback functor*
  - In 32.9: *2-category of fibred categories over  $\mathcal{C}$*
  - In 33.2: *relative inertia of  $\mathcal{S}$  over  $\mathcal{S}'$ , inertia fibred category  $\mathcal{I}_{\mathcal{S}}$  of  $\mathcal{S}$*
  - In 34.1: *fibred in groupoids*
  - In 34.6: *2-category of categories fibred in groupoids over  $\mathcal{C}$*
  - In 35.2: *split fibred category,  $\mathcal{S}_F$*
  - In 36.2: *split category fibred in groupoids,  $\mathcal{S}_F$*
  - In 37.1: *discrete*
  - In 37.2: *category fibred in sets, category fibred in discrete categories*
  - In 37.3: *2-category of categories fibred in sets over  $\mathcal{C}$*
  - In 38.1: *setoid*
  - In 38.2: *category fibred in setoids*
  - In 38.3: *2-category of categories fibred in setoids over  $\mathcal{C}$*
  - In 39.1: *representable*
  - In 40.5: *representable,  $\mathcal{X}$  is relatively representable over  $\mathcal{Y}$*
- 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 7.7: *totally disconnected*
  - In 7.9: *locally connected*
  - In 8.1: *irreducible, irreducible component*
  - In 8.4: *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, proper, quasi-proper, universally closed*

- 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*
- 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  $\mathcal{B}$*

**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 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 14.4: *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 19.1: *cocontinuous*
  - In 24.1: *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 28.2: *special cocontinuous functor  $u$  from  $\mathcal{C}$  to  $\mathcal{D}$*
  - In 29.4: *localization of the topos  $Sh(\mathcal{C})$  at  $\mathcal{F}$ , localization morphism*
  - In 31.1: *point of the topos  $Sh(\mathcal{C})$*
  - In 31.2: *point  $p$  of the site  $\mathcal{C}$*
  - In 31.6: *skyscraper sheaf*
  - In 35.1: *2-morphism from  $f$  to  $g$*
  - In 36.2: *morphism  $f : p \rightarrow p'$*
  - In 37.1: *conservative, has enough points*
  - In 39.2: *weakly contractible, enough weakly contractible objects, enough  $P$  objects*
  - In 41.1: *sheaf theoretically empty*
  - In 41.3: *almost cocontinuous*
  - In 42.1: *embedding*
  - In 42.2: *subtopos*
  - In 42.4: *open subtopos*
  - In 42.6: *closed subtopos*
  - In 42.7: *open immersion, closed immersion*
  - In 43.1: *pushforward*
  - In 44.1: *global sections*
  - In 46.1: *sieve  $S$  on  $U$*
  - In 46.3: *sieve on  $U$  generated by the morphisms  $f_i$*
  - In 46.4: *pullback of  $S$  by  $f$*
  - In 46.6: *topology on  $\mathcal{C}$*
  - In 46.8: *finer*
  - In 46.10: *sheaf*
  - In 46.12: *canonical topology*
  - In 47.2: *topology associated to  $\mathcal{C}$*
  - In 48.2: *separated*
  - In 48.4: *sheaf associated to  $\mathcal{F}$*
  - In 51.1: *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  $f$*
- 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: *algebraically closed, 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 15.7: *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**
- 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 8.11: *relation*
- In 9.1: *multiplicative subset of  $R$*
- In 9.2: *localization of  $A$  with respect to  $S$*
- In 9.6: *localization*
- In 11.1:  *$R$ -bilinear*
- In 11.6:  *$(A, B)$ -bimodule*
- In 13.1: *base change, base change*
- In 16.1: *spectrum*
- In 16.3: *Zariski, standard opens*
- In 17.1: *local ring, local homomorphism of local rings, local ring map  $\varphi : R \rightarrow S$*
- In 27.2: *Oka family*
- In 31.1: *locally nilpotent, nilpotent*
- In 34.1: *Jacobson ring*
- In 35.1: *integral over  $R$ , integral*
- In 35.9: *integral closure, integrally closed*
- In 36.1: *normal*
- In 36.3: *almost integral over  $R$ , completely normal*
- In 36.11: *normal*
- In 37.1: *integral over  $I$*
- In 38.1: *flat, faithfully flat, flat, faithfully flat*
- In 39.1: *support of  $M$*
- In 39.3: *annihilator of  $m$ , annihilator of  $M$*
- In 40.1: *going up, going down*
- In 41.1: *separably generated over  $k$ , separable over  $k$*
- In 42.1: *geometrically reduced over  $k$*
- In 44.1: *perfect*
- In 44.5: *perfect closure*
- In 46.4: *geometrically irreducible over  $k$*
- In 47.3: *geometrically connected over  $k$*
- In 48.1: *geometrically integral over  $k$*
- In 49.1: *dominates, valuation ring, centered*
- In 49.13: *value group, valuation, discrete valuation ring*
- In 51.1: *length*
- In 51.9: *simple*
- In 52.1: *Artinian*
- In 53.1: *essentially of finite type, essentially of finite presentation*
- In 56.1: *homogeneous spectrum*
- In 57.3: *numerical polynomial*
- In 58.1: *an ideal of definition of  $R$*
- In 58.6: *Hilbert polynomial*
- In 58.8:  *$d(M)$*
- In 59.1: *Krull dimension*
- In 59.2: *height*

- In 59.9: *system of parameters of  $R$ , regular local ring, regular system of parameters*
- In 62.1: *associated*
- In 63.1: *symbolic power*
- In 64.2: *relative assassin of  $N$  over  $S/R$*
- In 65.1: *weakly associated*
- In 66.1: *embedded associated primes, embedded primes of  $R$*
- In 67.1:  *$M$ -regular sequence,  $M$ -regular sequence in  $I$ , regular sequence*
- In 68.1:  *$M$ -quasi-regular, quasi-regular sequence*
- In 69.1: *blowup algebra, Rees algebra, affine blowup algebra*
- In 70.2: *resolution, resolution of  $M$  by free  $R$ -modules, resolution of  $M$  by finite free  $R$ -modules*
- In 71.1:  *$I$ -depth, depth*
- In 76.1: *projective*
- In 77.1: *locally free, finite locally free, finite locally free of rank  $r$*
- In 81.1: *universally injective, universally exact*
- In 83.1: *direct sum dévissage, Kaplansky dévissage*
- In 85.1: *Mittag-Leffler*
- In 87.1: *Mittag-Leffler directed system of modules*
- In 87.2: *dominates*
- In 87.7: *Mittag-Leffler*
- In 89.1: *coherent module, coherent ring*
- In 95.2:  *$I$ -adically complete,  $I$ -adically complete*
- In 101.5: *rank*
- In 102.1: *Cohen-Macaulay*
- In 102.8: *maximal Cohen-Macaulay*
- In 102.12: *Cohen-Macaulay*
- In 103.1: *Cohen-Macaulay*
- In 103.6: *Cohen-Macaulay*
- In 104.1: *catenary*
- In 104.3: *universally catenary*
- In 107.1: *pure*
- In 108.2: *finite projective dimension, projective dimension*
- In 108.10: *finite global dimension, global dimension*
- In 109.7: *regular*
- In 111.5: *local ring of the fibre at  $\mathfrak{q}$*
- In 118.8: *uniformizer*
- In 119.1: *associates, irreducible, prime*
- In 119.4: *unique factorization domain, UFD*
- In 119.12: *principal ideal domain, PID*
- In 119.14: *Dedekind domain*
- In 120.2: *order of vanishing along  $R$*
- In 120.3: *lattice in  $V$*
- In 120.5: *distance between  $M$  and  $M'$*
- In 121.3: *quasi-finite at  $\mathfrak{q}$ , quasi-finite*
- In 122.8: *strongly transcendental over  $R$*
- In 124.1: *relative dimension of  $S/R$  at  $\mathfrak{q}$ , relative dimension of*
- In 130.1: *derivation,  $R$ -derivation, Leibniz rule*
- In 130.2: *module of Kähler differentials, module of differentials*
- In 131.1: *differential operator  $D : M \rightarrow N$  of order  $k$*
- In 131.4: *module of principal parts of order  $k$*
- In 132.1: *naive cotangent complex*
- In 133.1: *global complete intersection over  $k$ , local complete intersection over  $k$*
- In 133.5: *complete intersection (over  $k$ )*
- In 134.1: *syntomic, flat local complete intersection over  $R$*
- In 134.5: *relative global complete intersection*
- In 135.1: *smooth*
- In 135.6: *standard smooth algebra over  $R$*
- In 135.11: *smooth at  $\mathfrak{q}$*
- In 136.1: *formally smooth over  $R$*
- In 139.1: *small extension*
- In 141.1: *étale, étale at  $\mathfrak{q}$*
- In 141.13: *standard étale*
- In 144.1: *formally unramified over  $R$*
- In 145.2: *universal first order thickening, conormal module,  $C_{S/R}$*
- In 146.1: *formally étale over  $R$*
- In 147.1: *unramified,  $G$ -unramified, unramified at  $\mathfrak{q}$ ,  $G$ -unramified at  $\mathfrak{q}$*
- In 148.1: *henselian, strictly henselian*
- In 150.3: *henselization, strict henselization of  $R$  with respect to  $\kappa \subset \kappa^{\text{sep}}$ , strict henselization*

- In 151.1:  $(R_k)$ , regular in codimension  $\leq k$ ,  $(S_k)$
- In 154.1: complete local ring
- In 154.4: coefficient ring
- In 154.5: Cohen ring
- In 155.1:  $N-1$ ,  $N-2$ , Japanese
- In 156.1: universally Japanese, Nagata ring
- In 156.9: analytically unramified, analytically unramified
- In 159.2: geometrically normal
- In 160.2: geometrically regular
- In 12.2: homotopy equivalence, homotopy equivalent
- In 12.4: quasi-isomorphism, acyclic
- In 12.8: homotopy equivalence, homotopy equivalent
- In 12.10: quasi-isomorphism, acyclic
- In 13.1:  $k$ -shifted chain complex  $A[k]_\bullet$
- In 13.2:  $H_{i+k}(A_\bullet) \rightarrow H_i(A[k]_\bullet)$
- In 13.7:  $k$ -shifted cochain complex  $A[k]^\bullet$
- In 13.8:  $H^{i+k}(A^\bullet) \rightarrow H^i(A[k]^\bullet)$
- In 15.1: category of graded objects of  $\mathcal{A}$
- In 15.4: shift

### 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, 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: Serre subcategory, weak Serre subcategory
- In 9.5: kernel of the functor  $F$
- In 10.1: zeroth  $K$ -group of  $\mathcal{A}$
- In 11.1: cohomological  $\delta$ -functor,  $\delta$ -functor
- In 11.2: morphism of  $\delta$ -functors from  $F$  to  $G$
- In 11.3: universal  $\delta$ -functor
- In 16.1: decreasing filtration, filtered object of  $\mathcal{A}$ , morphism  $(A, F) \rightarrow (B, F)$  of filtered objects, induced filtration, quotient filtration, finite, separated, exhaustive
- In 16.3: strict
- In 17.1: spectral sequence in  $\mathcal{A}$ , morphism of spectral sequences
- In 17.2: limit, degenerates at  $E_r$
- In 18.1: exact couple, morphism of exact couples
- In 18.3: spectral sequence associated to the exact couple
- In 19.1: differential object, morphism of differential objects
- In 19.3: homology
- In 19.5: spectral sequence associated to  $(A, d, \alpha)$
- In 20.1: filtered differential object
- In 20.4: induced filtration
- In 20.6: weakly converges to  $H(K)$ , abuts to  $H(K)$
- In 21.1: filtered complex  $K^\bullet$  of  $\mathcal{A}$
- In 21.5: induced filtration
- In 21.7: regular, coregular, bounded, bounded below, bounded above
- In 21.9: weakly converges to  $H^*(K^\bullet)$ , abuts to  $H^*(K^\bullet)$ , converges to  $H^*(K^\bullet)$
- In 22.1: double complex
- In 22.3: associated simple complex  $sA^\bullet$ , associated total complex
- In 22.5: weakly converges to  $H^n(sK^\bullet)$ , abuts to  $H^n(sK^\bullet)$ , converges to  $H^n(sK^\bullet)$ , weakly converges to  $H^n(sK^\bullet)$ , abuts to  $H^n(sK^\bullet)$ , converges to  $H^n(sK^\bullet)$

In 24.1: *injective*  
 In 24.4: *enough injectives*  
 In 24.5: *functorial injective embeddings*  
 In 25.1: *projective*  
 In 25.4: *enough projectives*  
 In 25.5: *functorial projective surjections*  
 In 28.2: *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 14.1: *category of finite filtered objects of  $\mathcal{A}$*   
 In 14.2: *filtered quasi-isomorphism, filtered acyclic*  
 In 14.5: *filtered derived category of  $\mathcal{A}$*   
 In 14.7: *bounded filtered derived category*  
 In 15.2: *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 15.9: *right derivable, everywhere defined, left derivable, everywhere defined*  
 In 15.10: *computes, computes*  
 In 16.3: *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 17.2:  *$i$ 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 29.1:  *$K$ -injective*  
 In 31.1: *derived colimit, homotopy colimit*  
 In 32.1: *derived limit, homotopy limit*  
 In 33.2: *classical generator, strong generator, weak generator, generator*  
 In 34.1: *compact object*  
 In 34.5: *compactly generated*  
 In 37.1: *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 connecting  $a$  to  $b$ , homotopic
- In 26.6: homotopy equivalence, homotopy equivalent
- In 28.1: homotopic, homotopy connecting  $a$  and  $b$
- 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  $R \rightarrow R'$
- In 28.1: Koszul complex
- In 28.2: Koszul complex on  $f_1, \dots, f_r$
- In 29.1:  $M$ -Koszul-regular,  $M$ - $H_1$ -regular, Koszul-regular,  $H_1$ -Koszul-regular
- In 31.1: regular ideal, Koszul-regular ideal,  $H_1$ -regular ideal, quasi-regular ideal
- In 32.2: local complete intersection
- In 35.1: 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 36.1: formally smooth over  $R$
- In 36.3: formally smooth for the  $\mathfrak{n}$ -adic topology
- In 40.1: regular
- In 45.1:  $p$ -independent over  $k$ ,  $p$ -basis of  $K$  over  $k$
- In 46.1:  $J$ -0,  $J$ -1,  $J$ -2
- In 49.1:  $G$ -ring
- In 51.1: quasi-excellent, excellent
- In 54.1: injective
- In 54.5:  $M \mapsto M^\vee$ , free module
- In 57.3:  $K$ -flat
- In 57.15: derived tensor product
- In 59.1: Tor independent over  $R$
- In 62.1:  $m$ -pseudo-coherent, pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent
- In 63.1: tor-amplitude in  $[a, b]$ , finite tor dimension, tor dimension  $\leq d$ , finite tor dimension
- In 65.1: finite projective dimension, projective-amplitude in  $[a, b]$
- In 66.1: finite injective dimension, injective-amplitude in  $[a, b]$
- In 69.1: perfect, perfect
- In 73.2: finitely presented relative to  $R$
- In 74.4:  $m$ -pseudo-coherent relative to  $R$ , pseudo-coherent relative to  $R$ ,  $m$ -pseudo-coherent relative to  $R$ , pseudo-coherent relative to  $R$
- In 75.1: pseudo-coherent ring map, perfect ring map
- In 76.1:  $R$ -perfect, perfect relative to  $R$
- In 79.1:  $I$ -power torsion module, an  $f$ -power torsion module
- In 82.4: derived complete with respect to  $I$ , derived complete with respect to  $I$
- In 90.1: absolutely flat, weakly étale, absolutely flat
- In 90.3: weak dimension  $\leq d$
- In 92.1: unibranch, geometrically unibranch
- In 92.6: number of branches of  $A$ , number of geometric branches of  $A$
- In 94.1: formally catenary

In 96.1: *extension of discrete valuation rings, ramification index, weakly unramified, residual degree, residue degree*  
 In 96.7: *unramified with respect to  $A$ , tamely ramified with respect to  $A$ , totally ramified with respect to  $A$*   
 In 96.10: *decomposition group of  $\mathfrak{m}$ , inertia group of  $\mathfrak{m}$*   
 In 96.13: *wild inertia group of  $\mathfrak{m}$ , tame inertia group of  $\mathfrak{m}$*   
 In 97.3: *mixed characteristic, absolute ramification index*  
 In 98.2: *weak solution for  $A \subset B$ , solution for  $A \subset B$ , separable solution*  
 In 99.1: *invertible, trivial*  
 In 100.1: *extension of valuation rings, weakly unramified, residual degree, residue degree*  
 In 101.5: *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 16.1: *flat*  
 In 16.3: *flat at  $x$*   
 In 18.1: *flat at  $x$ , flat*  
 In 18.3: *flat over  $Y$  at a point  $x \in X$ , flat over  $Y$*

In 21.1: *Koszul complex*  
 In 21.2: *Koszul complex on  $f_1, \dots, f_r$*   
 In 22.1: *invertible  $\mathcal{O}_X$ -module, trivial*  
 In 22.6: *tensor power*  
 In 22.7: *associated graded ring*  
 In 22.9: *Picard group*  
 In 25.1:  *$\mathcal{O}_1$ -derivation,  $\varphi$ -derivation, Leibniz rule*  
 In 25.3: *module of differentials, universal  $\varphi$ -derivation*  
 In 25.10:  *$S$ -derivation, sheaf of differentials  $\Omega_{X/S}$  of  $X$  over  $S$*   
 In 26.1: *naive cotangent complex*  
 In 26.6: *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 30.1: *flat, flat*  
 In 30.3: *flat over  $(Sh(\mathcal{D}), \mathcal{O}')$*

- In 31.1: rank  $r$ , invertible,  $\mathcal{O}^*$
- In 31.6: Picard group
- In 32.1:  $\mathcal{O}_1$ -derivation,  $\varphi$ -derivation, Leibniz rule
- In 32.3: module of differentials, universal  $\varphi$ -derivation
- In 32.10:  $Y$ -derivation, sheaf of differentials  $\Omega_{X/Y}$  of  $X$  over  $Y$ , universal  $Y$ -derivation
- In 33.1: differential operator  $D : \mathcal{F} \rightarrow \mathcal{G}$  of order  $k$
- In 33.4: module of principal parts of order  $k$
- In 34.1: naive cotangent complex
- In 34.4: naive cotangent complex
- In 39.4: locally ringed site
- In 39.6: locally ringed
- In 39.9: morphism of locally ringed topoi, morphism of locally ringed sites
- In 42.1: constant sheaf, locally constant, finite locally constant
- In 5.1: 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 9.1: Čech complex, Čech cohomology groups
- In 14.4: limp
- In 18.2:  $K$ -flat
- In 18.12: derived tensor product
- In 18.13: Tor
- In 25.2: qc covering
- In 34.1: simplicial  $\mathcal{A}_\bullet$ -module, simplicial sheaf of  $\mathcal{A}_\bullet$ -modules
- In 36.1: strictly perfect
- In 37.1:  $m$ -pseudo-coherent, pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent
- In 38.1: tor-amplitude in  $[a, b]$ , finite tor dimension, locally has finite tor dimension
- In 39.1: perfect, perfect

**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 5.1: torsor,  $\mathcal{G}$ -torsor, morphism of  $\mathcal{G}$ -torsors, trivial  $\mathcal{G}$ -torsor
- In 10.1: Čech complex, Čech cohomology groups
- In 13.1: flasque, flabby
- In 24.1: alternating Čech complex
- In 24.2: ordered Čech complex
- In 25.2: locally finite
- In 27.2:  $K$ -flat
- In 27.13: derived tensor product
- In 27.14: Tor
- In 40.1: strictly perfect
- In 41.1:  $m$ -pseudo-coherent, pseudo-coherent,  $m$ -pseudo-coherent, pseudo-coherent
- In 42.1: tor-amplitude in  $[a, b]$ , finite tor dimension, locally has finite tor dimension
- In 43.1: perfect, perfect

**Cohomology on Sites**

**Differential Graded Algebra**

- In 3.1: differential graded algebra over  $R$
- In 3.2: homomorphism of differential graded algebras
- In 3.3: opposite differential graded algebra
- In 3.4: commutative, strictly commutative
- In 3.5: 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 15.2: derived category of  $(A, d)$
- In 17.1:  $R$ -linear category  $\mathcal{A}$
- In 17.2: functor of  $R$ -linear categories,  $R$ -linear
- In 18.1: graded category  $\mathcal{A}$  over  $R$

In 18.2: *functor of graded categories over  $R$ , graded functor*  
 In 18.3:  $\mathcal{A}^0$   
 In 18.4: *graded direct sum*  
 In 19.1: *differential graded category  $\mathcal{A}$  over  $R$*   
 In 19.2: *functor of differential graded categories over  $R$*   
 In 19.3: *category of complexes of  $\mathcal{A}$ , homotopy category of  $\mathcal{A}$*   
 In 19.4: *differential graded direct sum*

### 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 6.4: *compatible with the differential graded structure*  
 In 8.5: *complete intersection, local complete intersection*

### 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*  
 In 12.5: *scheme structure on  $Z$ , reduced induced scheme structure, reduction  $X_{\text{red}}$  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*

### 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  $\text{Proj}$  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 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 9.1: *surjective*
- In 10.1: *universally injective, radicial*
- In 11.1: *affine*
- In 12.1: *quasi-affine*
- In 13.1: *local, stable under base change, stable under composition*
- In 13.2: *locally of type  $P$*
- In 14.1: *finite type at  $x \in X$ , locally of finite type, finite type*
- In 15.3: *finite type point*
- In 16.1: *universally catenary*
- In 18.1:  *$J$ -2*
- In 19.1: *quasi-finite at a point  $x \in X$ , locally quasi-finite, quasi-finite*
- In 20.1: *finite presentation at  $x \in X$ , locally of finite presentation, finite presentation*
- In 22.1: *open, universally open*
- In 23.1: *submersive, universally submersive*
- In 24.1: *flat at a point  $x \in X$ , flat over  $S$  at a point  $x \in X$ , flat, flat over  $S$*
- In 25.3: *canonical scheme structure on  $T$*
- In 28.1: *relative dimension  $\leq d$  at  $x$ , relative dimension  $\leq d$ , relative dimension  $d$*
- In 29.1: *syntomic at  $x \in X$ , syntomic, local complete intersection over  $k$ , standard syntomic*
- In 29.15: *syntomic of relative dimension  $d$*
- In 30.1: *conormal sheaf  $\mathcal{C}_{Z/X}$  of  $Z$  in  $X$ , conormal sheaf of  $i$*
- In 31.1: *sheaf of differentials  $\Omega_{X/S}$  of  $X$  over  $S$ , universal  $S$ -derivation*
- In 32.1: *smooth at  $x \in X$ , smooth, standard smooth*
- In 32.13: *smooth of relative dimension  $d$*
- In 33.1: *unramified at  $x \in X$ ,  $G$ -unramified at  $x \in X$ , unramified,  $G$ -unramified*

### 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*

### Morphisms of Schemes

- In 34.1: *étale at  $x \in X$ , étale, standard étale*
  - In 35.1: *relatively ample,  $f$ -relatively ample, ample on  $X/S$ ,  $f$ -ample*
  - In 36.1: *relatively very ample,  $f$ -relatively very ample, very ample on  $X/S$ ,  $f$ -very ample*
  - In 38.1: *quasi-projective,  $H$ -quasi-projective, locally quasi-projective*
  - In 39.1: *proper*
  - In 41.1: *projective,  $H$ -projective, locally projective*
  - In 42.1: *integral, finite*
  - In 43.1: *universal homeomorphism*
  - In 45.1: *finite locally free, rank, degree*
  - In 46.1: *equivalent, rational map from  $X$  to  $Y$ ,  $S$ -rational map from  $X$  to  $Y$*
  - In 46.3: *rational function on  $X$*
  - In 46.4: *ring of rational functions on  $X$*
  - In 46.6: *function field, field of rational functions*
  - In 46.8: *defined in a point  $x \in X$ , domain of definition*
  - In 46.10: *dominant*
  - In 46.11: *birational,  $S$ -birational*
  - In 47.1: *birational*
  - In 48.8: *degree of  $X$  over  $Y$*
  - In 48.11: *modification of  $X$*
  - In 48.12: *alteration of  $X$*
  - In 50.2: *integral closure of  $\mathcal{O}_X$  in  $\mathcal{A}$*
  - In 50.3: *normalization of  $X$  in  $Y$*
  - In 51.1: *normalization*
  - In 53.1: *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 32.1: *Euler characteristic of  $\mathcal{F}$*
- In 34.7:  *$m$ -regular*
- In 34.15: *Hilbert polynomial*
- In 35.1: *absolute Frobenius of  $X$*
- In 35.4: *relative Frobenius morphism of  $X/S$*
- In 38.3:  *$\delta$ -invariant of  $A$*
- In 38.7:  *$\delta$ -invariant of  $X$  at  $x$*
- In 39.4:  *$A$  is a wedge of  $A_1, \dots, A_n$*
- In 42.1: *curve*
- In 43.1: *degree, degree*
- In 44.3: *intersection number*
- In 44.10: *degree of  $Z$  with respect to  $\mathcal{L}$*
- In 45.1: *embedding dimension of  $X$  at  $x$*
- In 45.2: *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  $S$*
- In 3.14: *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  $S$*
- In 4.14: *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 8.8: *big ph site*
- In 8.10: *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*

**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*  $(Sch/S)_\tau$ , *sheaf of  $\mathcal{O}$ -modules associated to  $\mathcal{F}$* , *sheaf of  $\mathcal{O}$ -modules associated to  $\mathcal{F}$*
  - In 9.1: *parasitic*, *parasitic for the  $\tau$ -topology*
  - In 12.1: *local in the  $\tau$ -topology*
  - In 17.1: *germ of  $X$  at  $x$* , *morphism of germs*, *composition of morphisms of germs*
  - In 17.2: *étale*, *smooth*
  - In 18.1: *étale local*, *smooth local*
  - In 19.1:  *$\tau$  local on the base*,  *$\tau$  local on the target*, *local on the base for the  $\tau$ -topology*
  - In 23.1:  *$\tau$  local on the source*, *local on the source for the  $\tau$ -topology*
  - In 29.3: *étale local on source-and-target*
  - In 30.1: *étale local on the source-and-target*
  - In 31.1: *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 31.3: *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 31.7: *pullback functor*
  - In 31.9: *pullback functor*
  - In 31.10: *trivial descent datum*, *canonical descent datum*, *effective*
  - In 31.11: *canonical descent datum*, *effective*
  - In 33.1: *morphisms of type  $\mathcal{P}$  satisfy descent for  $\tau$ -coverings*
- Derived Categories of Schemes**
- In 6.4: *supported on  $T$*
  - In 13.1: *approximation holds for the triple*
  - In 13.2: *approximation by perfect complexes holds*
  - In 21.2: *Tor independent over  $S$*
  - In 31.1: *perfect relative to  $S$* ,  *$S$ -perfect*
- 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 18.1: *normal at  $x$* , *normal morphism*
  - In 19.1: *regular at  $x$* , *regular morphism*
  - In 20.1: *Cohen-Macaulay at  $x$* , *Cohen-Macaulay morphism*
  - In 31.1: *étale neighbourhood of  $(S, s)$* , *morphism of étale neighbourhoods*, *elementary étale neighbourhood*
  - In 48.1: *finitely presented relative to  $S$* , *of finite presentation relative to  $S$*
  - In 49.2:  *$m$ -pseudo-coherent relative to  $S$* , *pseudo-coherent relative to  $S$* ,  *$m$ -pseudo-coherent relative to  $S$* , *pseudo-coherent relative to  $S$*
  - In 50.2: *pseudo-coherent*
  - In 51.2: *perfect*
  - In 52.2: *Koszul at  $x$* , *Koszul morphism*, *local complete intersection morphism*
  - In 54.1: *weakly étale*, *absolutely flat*
  - In 56.1: *ind-quasi-affine*, *ind-quasi-affine*
- 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  $\mathfrak{t}$*
  - 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 21.2: *flattening stratification, flattening stratification*

### 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 4.4: *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*

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 7.5:  *$\delta$ -dimension of  $Z$*

In 8.1: *cycle on  $X$ ,  $k$ -cycle*

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: *rationally 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: *Weil divisor associated to  $s$ , Weil divisor associated to  $\mathcal{L}$*

In 23.1: *intersection with the first chern class of  $\mathcal{L}$*

In 27.1: *Gysin homomorphism*

In 31.1: *bivariant class  $c$  of degree  $p$  for  $f$*

- In 31.2: *Chow cohomology*
- In 33.1: *chern classes of  $\mathcal{E}$  on  $X$ , total chern class of  $\mathcal{E}$  on  $X$*
- In 34.1: *intersection with the  $j$ th chern class of  $\mathcal{E}$*
- In 40.1: *degree of a zero cycle*
- In 42.2: *admissible, symbol, admissible relation, determinant of the finite length  $R$ -module  $M$*
- In 42.13: *determinant of  $(M, \varphi, \psi)$*
- In 42.29: *symbol associated to  $M, a, b$*
- In 42.31: *tame symbol*
- In 43.15:  *$\epsilon$ -invariant*
- In 43.17: *sum of the effective Cartier divisors*
- 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*
- 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 21.5: *dualizing complex normalized relative to  $\omega_{\mathfrak{g}}$*
- In 25.1: *Gorenstein*
- In 26.2: *Gorenstein at  $x$ , Gorenstein morphism*
- In 28.1: *relative dualizing complex*
- Discriminants and Differents**
- In 4.1: *trace element*
- In 6.1: *Kähler different*
- In 8.1: *different*
- Local Cohomology**
- In 3.2: *cohomological dimension of  $I$  in  $A$*
- In 12.1:  *$I$ -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*
- 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, 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: *standard  $\tau$ -covering*
- In 20.4: *big  $\tau$ -site of  $S$ , small  $\tau$ -site of  $S$*
- 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 55.1: *absolute Galois group, algebraic*
- In 56.1:  *$G$ -module, discrete  $G$ -module, morphism of  $G$ -modules,  $R$ - $G$ -module, morphism of  $R$ - $G$ -modules*
- In 56.2: *continuous group cohomology groups, group cohomology groups, Galois cohomology groups, Galois cohomology groups of  $K$  with coefficients in  $M$*
- In 60.3: *similar, equivalent*
- In 60.4: *Brauer group*
- In 63.1: *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 65.1: *trace*
- In 66.5:  *$C_r$ , nontrivial solution*
- In 66.9: *variety, curve*
- In 69.1: *extension by zero, extension by zero*
- In 70.1: *constructible, constructible, constructible*
- In 86.4: *geometric frobenius*
- In 86.8: *arithmetic frobenius*
- In 86.10: *geometric frobenius*

In 87.1: *trace*  
 In 89.4: *total right derived functor of  $F$ , total right derived functor of  $G$*   
 In 90.1: *filtered injective, projective, filtered quasi-isomorphism*  
 In 91.1: *filtered derived functor*  
 In 93.1: *perfect*  
 In 95.1: *finite Tor-dimension*  
 In 96.1:  $D_c(X, \Lambda)$   
 In 96.7:  $D_{ctf}(X, \Lambda)$   
 In 98.1: *global Lefschetz number*  
 In 98.2: *local Lefschetz number*  
 In 99.2:  *$G$ -trace of  $f$  on  $P$*   
 In 102.1:  $\mathbf{Z}_\ell$ -sheaf,  $\ell$ -adic sheaf, *lisse, morphism*  
 In 102.6: *torsion, stalk*  
 In 102.8:  $\ell$ -adic cohomology  
 In 103.1:  *$L$ -function of  $\mathcal{F}$*   
 In 103.3:  *$L$ -function of  $\mathcal{F}$*   
 In 111.1: *open*  
 In 115.1: *unramified cusp form on  $GL_2(\mathbf{A})$  with values in  $\Lambda$*

### 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 10.1:  *$w$ -contractible*  
 In 11.1: *pro-étale covering of  $T$*   
 In 11.6: *standard pro-étale covering*  
 In 11.8: *big pro-étale site*  
 In 11.12: *big pro-étale site of  $S$ , small pro-étale site of  $S$ , big affine pro-étale site of  $S$*   
 In 11.18: *restriction to the small pro-étale site*  
 In 22.1: *extension by zero, extension by zero*  
 In 23.1: *constructible*  
 In 24.1: *constructible  $\Lambda$ -sheaf, lisse, adic lisse, adic constructible*  
 In 25.1: *constructible*  
 In 25.4: *adic lisse, adic constructible*

### 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 12.6: *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  $X_{étale}$*
- In 18.2:  *$X_{spaces,étale}$*
- In 18.6: *étale topos, small étale topos*
- In 18.8:  *$f$ -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*
- 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  $x$*
- 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 49.3: *normalization*  
 In 53.2: *universal homeomorphism*

### 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:  *$(\text{Spaces}/S)_{\text{ph}}$*
- In 8.6:  *$(\text{Spaces}/X)_{\text{ph}}$*
- 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 9.1:  *$\tau$  local on the base,  $\tau$  local on the target, local on the base for the  $\tau$ -topology*
- In 13.1:  *$\tau$  local on the source, local on the source for the  $\tau$ -topology*
- In 19.1: *smooth local on source-and-target*
- In 20.1: *étale-smooth local on source-and-target*
- In 21.1: *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 21.3: *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 21.7: *pullback functor*
- In 21.9: *pullback functor*
- In 21.10: *trivial descent datum, canonical descent datum, effective*
- In 21.11: *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  $B$*

**More on Morphisms of Spaces**

- In 3.1: *radicial*
- In 5.1: *conormal sheaf  $C_{Z/X}$  of  $Z$  in  $X$ , conormal sheaf of  $i$*
- In 6.1: *conormal algebra  $C_{Z/X,*}$  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 43.2: *Koszul-regular immersion,  $H_1$ -regular immersion, quasi-regular immersion*

In 44.3: *m*-pseudo-coherent relative to  $Y$ , pseudo-coherent relative to  $Y$ , *m*-pseudo-coherent relative to  $Y$ , pseudo-coherent relative to  $Y$   
 In 45.1: pseudo-coherent, pseudo-coherent at  $x$   
 In 46.1: perfect, perfect at  $x$   
 In 47.1: Koszul morphism, local complete intersection morphism, Koszul at  $x$   
 In 51.1: perfect relative to  $Y$ ,  $Y$ -perfect  
 In 54.1: 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 15.2: stabilizer of the groupoid in algebraic spaces  $(U, R, s, t, c)$   
 In 16.2: restriction of  $(U, R, s, t, c)$  to  $U'$   
 In 17.1:  $R$ -invariant,  $R$ -invariant,  $R$ -invariant  
 In 18.1: quotient sheaf  $U/R$   
 In 18.3: quotient representable by an algebraic space, representable quotient, representable quotient, quotient representable by an algebraic space  
 In 19.1: 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: *ith 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 14.1: *simplicial system of the derived category, cartesian, morphism of simplicial systems of the derived category*

In 15.1: *simplicial system of the derived category of modules, cartesian, morphism of simplicial systems of the derived category of modules*

In 28.1: *cartesian, Y is cartesian over X*

In 28.3: *simplicial scheme associated to f*

#### Duality for Spaces

In 2.2: *dualizing complex*

In 9.1: *relative dualizing complex*

### Formal Algebraic Spaces

In 4.6: *tensor product, completed tensor product*

In 4.7: *topologically nilpotent, weak ideal of definition, weakly pre-admissible, weakly admissible*

In 4.10: *taut*

In 5.1: *affine formal algebraic space, morphism of affine formal algebraic spaces*

In 5.7: *McQuillan, classical, adic, adic\*, Noetherian*

In 5.9: *formal spectrum*

In 6.2: *countably indexed*

In 7.1: *formal algebraic space, morphism of formal algebraic spaces*

In 9.3: *completion of X along T*

In 11.3: *quasi-separated, separated*

In 12.2: *quasi-compact*

In 12.4: *quasi-compact*

In 15.5: *locally countably indexed, locally adic\*, locally Noetherian*

In 17.1: *adic morphism*

In 18.1: *locally of finite type, finite type*

In 19.1: *monomorphism*

In 20.1: *closed immersion*

In 22.1: *topologically of finite type over*

In 23.1: *separated, quasi-separated*

In 24.1: *proper*

In 27.1: *small étale site*

### Restricted Power Series

In 5.2: *rig-étale*

In 9.1: *rig-surjective*

### 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  $TF$  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 12.1:  *$A$ -biderivation*  
 In 16.1: *Atiyah class*  
 In 17.1: *standard resolution of  $\mathcal{B}$  over  $\mathcal{A}$*   
 In 17.2: *cotangent complex*  
 In 18.1: *Atiyah class*  
 In 19.1: *cotangent complex*  
 In 21.1: *cotangent complex*  
 In 23.1: *cotangent complex  $L_{X/Y}$  of  $X$  over  $Y$*   
 In 25.1: *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 11.5: *locally quasi-coherent*

**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 21.1: *obstruction theory, obstruction modules, obstruction*  
 In 22.5: *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 9.8: *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: *flat*  
 In 25.2: *flat at  $x$*   
 In 26.1: *locally of finite presentation, of finite presentation*  
 In 27.1: *gerbe over, gerbe*  
 In 32.1: *smooth*  
 In 33.2: *has property  $\mathcal{P}$*   
 In 34.1: *étale*  
 In 35.1: *unramified*  
 In 36.1: *proper*  
 In 37.1: *scheme theoretic image*  
 In 38.1: *dotted arrow, morphism of dotted arrows*  
 In 38.6: *uniqueness part of the valuative criterion*  
 In 38.10: *existence part of the valuative criterion*  
 In 43.1: *local complete intersection morphism, Koszul*

**Limits of Algebraic Stacks**

In 3.1: *limit preserving*

**Cohomology of Algebraic Stacks**

In 7.1: *flat base change property*  
 In 8.1: *parasitic*  
 In 11.1: *lisse-étale site, flat-fppf site*

**Derived Categories of Stacks**

In 4.1: *derived category of  $\mathcal{O}_X$ -modules with quasi-coherent cohomology sheaves*

**Introducing Algebraic Stacks**

In 4.3: *smooth*  
 In 5.1: *algebraic stack*

**More on Morphisms of Stacks**

In 3.1: *thickening, morphism of thickenings, thickenings over  $Z$ , morphisms of thickenings over  $Z$*   
 In 3.3: *first order thickening*  
 In 8.1: *formally smooth*  
 In 12.1: *categorical moduli space, uniform categorical moduli space in  $\mathcal{C}$ , uniform categorical moduli space in  $\mathcal{C}$*   
 In 13.1: *well-nigh affine*

**The Geometry of Algebraic Stacks**

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  $x$*

**Moduli Stacks**

**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  $g$*

**Examples**

**Exercises**

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*  
 In 6.22: *closed, specialization, generalization*  
 In 6.26: *connected, connected component*  
 In 9.1: *length*  
 In 17.1: *catenary, catenary*  
 In 21.1: *finite locally free, invertible module*  
 In 21.3: *class group of  $A$ , Picard group of  $A$*   
 In 23.1: *going-up theorem, going-down theorem*  
 In 25.1: *numerical polynomial*  
 In 25.2: *graded module, locally finite, Euler-Poincaré function, Hilbert function, Hilbert polynomial*  
 In 25.3: *graded  $A$ -algebra, graded module  $M$  over a graded  $A$ -algebra  $B$ , homomorphisms of graded modules/rings, graded submodules, graded ideals, exact sequences of graded modules*  
 In 26.1: *homogeneous*  
 In 26.2: *homogeneous spectrum  $\text{Proj}(R)$*   
 In 26.3:  *$R_{(f)}$*   
 In 27.1: *Cohen-Macaulay*  
 In 29.3: *filtered injective*  
 In 29.4:  *$\text{Fil}^f(\mathcal{A})$*   
 In 29.6: *filtered quasi-isomorphism*  
 In 29.7: *filtered acyclic*  
 In 32.12: *integral*  
 In 34.1: *dual numbers*  
 In 34.3: *tangent space of  $X$  over  $S$ , tangent vector*  
 In 35.1: *quasi-coherent*  
 In 35.2: *specialization*  
 In 35.5: *locally Noetherian, Noetherian*  
 In 35.6: *coherent*  
 In 39.1: *invertible  $\mathcal{O}_X$ -module*  
 In 39.4: *invertible module  $M$ , trivial*

In 39.7: <i>Picard group of <math>X</math></i>	<b>A Guide to the Literature</b>
In 40.2: $\delta(\tau)$	
In 48.1: <i>Weil divisor, prime divisor, Weil divisor associated to a rational function <math>f \in K(X)^*</math>, effective Cartier divisor, Weil divisor <math>[D]</math> associated to an effective Cartier divisor <math>D \subset X</math>, sheaf of total quotient rings <math>\mathcal{K}_S</math>, Cartier divisor, Weil divisor associated to a Cartier divisor</i>	<b>Desirables</b>
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