Chern-Weil Theory

Contents

0. Notes

1. Chern-Weil theory is *differential cohomology*.
2. This reflects a topos bit of 0.
3. One must include the theory of topological $\mathbb{R}$-modules and topological $\mathbb{C}$-modules and topological $\mathbb{H}$-modules.

1. is a colimit involving $\mathbb{Z}[n!^{-1}]$.
2. $\mathbb{R}^n$ is the set of points of a locale constructed from the inner product on ^{n} as a finite dimensional hilbert space.
3. $\mathbb{C}$ is $\mathbb{R}^2$.
4. The inverse function theorem
5. The implicit function theorem
6. The logarithm as an integral
7. The exponential defined on ^{x}, $\mathbb{C}^x$, and $\mathbb{R}^x$ using the inverse function theorem applied to the logarithm
8. The logarithm defined on particular elementary matrices to a power.
9. The exponential defined on elementary matrices.
10. The elemtnary matrices are to do with the Maurer-cartan form
11. log can proximally-locally be defined as the integral of the Maurer-cartain form $A^{-1}dA$ on GL
12. the correspondence between Lie-algebra valued differential forms on principal bundles and connections on their balanced product over X
13. the topologies of pointwise and uniform convergence respectively

1. The Chern classes
2.

...	EXAMPLE2

1. Unicode

Lean 4 uses unicode, and this entails an extensive catalogue of characters to choose from. Here is a list of the unicode characters we will use:

Symbol	Unicode	VSCode shortcut	Use
		Lean's Kernel	
$\times$	2A2F	\times	Product of types
$\to$	2192	\rightarrow	Hom of types
$\langle,\rangle$	27E8,27E9	\langle,\rangle	Product term introduction
$\mapsto$	21A6	\mapsto	Hom term introduction
$\wedge$	2227	\wedge	Conjunction
$\vee$	2228	\vee	Disjunction
$\forall$	2200	\forall	Universal quantification
$\exists$	2203	\exists	Existential quantification
$\neg$	00AC	\neg	Negation
		Variables and Constants	
	1D52,1D56		Variables and constants
	1D52,1D56		Variables and constants
$^{-}$	207B		Variables and constants
0,1,2,3,4,5,6,7,8,9	2080 - 2089	\0-\9	Variables and constants
α-ω,A-Ω	03B1-03C9		Variables and constants
		Adjunctions	
$\rightleftarrows$	21C4	\rightleftarrows	Adjunctions
$\leftrightarrows$	21C6	\leftrightarrows	Adjunctions
.	1BC94		Right adjoints
·	0971		Left adjoints
$\dashv$	22A3	\dashv	The condition that two Functors are adjoint
		Miscellaneous	
$\sim$	223C	\sim	Homotopies
$\simeq$	2243	\equiv	Equivalences
$\cong$	2245	\cong	Isomorphisms
∞	221E	\infty	Infinity categories and infinity groupoids

I

Exponentiable locales and exponentiable ∞-sheaves

1. Exponentiable ∞-sheaves
2. ...

Proper locales and local homeomorphisms of locales

1. Locally compact is equivalent to exponentiable

1. open/not
2. closed/not
3. universally/not
4. diagonal map/not
5.

Trace and determinant in Hilbert spaces

2. Trace of an operator

1. Given a free module, one can define the trace.

3. Determinant of an operator

1. Given a free module, one can define the determinant.

1. The Weil uniformization theorem
2. Tate's thesis shows that the Γ-function is a local L-function.

Smooth manifolds

Definition (open map of topological spaces):
Definition (immersion of topological spaces):
Theorem (open immersion of topological spaces is an immersion with open image):

$$\tilde{f} : X \to \tilde{Y}$$

There is a continuous function induced by the universal mapping property of pushout applied to $f \circ \pi_1$ and $f \circ \pi_2$:
Suppose that $\tilde{Y} \to Y$ is an isomorphism. Then the following are equivalent:

1. f is a local homeomorphism.
2. π_1 and π_2 are local homeomorphisms.

Local homeomorphisms between d-corners
local diffeomorphisms between disjoint unions of d-corners?

1. The étale fundamental group of the real numbers is $\mathbb{Z}/2\mathbb{Z}$.

II

G-groups and groups under G

G-groups and groups under G

G-∞-groups and ∞-groups under G

Lie-algebras

L^∞ algebras

L^∞ algebras

Formal group laws and Lie-algebras in characteristic 0

1. The BCH formula
2. Mathoverflow question on ...

Lie-algebra-valued differential forms

Definition 0.0.1. A

Definition 0.0.2.

Both a graded commutative differential graded algebra and a graded commutative differential graded algebra ...

Monoids in complexes.

1. An internal presheaf morphism 3 of an internal category.
2. A cogroup map $f : \Omega^{\cdot} A \to \Omega^{\cdot} \mathbb{R}$, $(f \quad f) \bullet \Delta = \Delta \bullet f$

exp :

L^{∞}-algebra valued differential forms

1. Is it natural to make L^{∞}-algebra valued differential forms only for differential graded A^{∞}-algebras.

Monoid actions in complexes.

Curvature

Ω^1(G,) : E_( ) G and the Maurer-Cartan form

1. The Maurer-Cartan form is a -valued 1-form on G onto which Ω^1(G,) deformation retracts.
2. Ω^1(G,) : E_( ) G, distinct from the instance of E_( ) G constructed in 1.1.1.1.1.
3. ω G : Ω^1(G,)
4. curvature

Ω^1(P,) $\cong$ ... $\cong$ Ω^1(G,) and the curvature form

The curvature form

1. In both commutative algebras and modules, CDGAs and CDGMs, Aut(X)-principal bundles are interesting.

2. Will I eventually only discuss calculus in ...

3.

There is an equivalence between:

1. Functors into G-principal bundles

2.

III

The first Chern-class

The Chern-homomorphism

The Chern classes

1. Do I need the fundamental theorem of of invariant theory?

The Chern roots

The Splitting principle

IV

The cohomology of Grassmanians

Distributions???

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BIBLIOGRAPHY

1.