UNIVERSITÄT DES SAARLANDES
FACHRICHTUNG MATHEMATIK
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Assignments for the lecture
Introduction to Noncommutative Differential Geometry
Summer term 2019

Assignment 3A
for the tutorial on *Tuesday, May 21, 10:15 am* (in Seminar Room 10)

Exercise 1. Let $\mathcal{M}$ be a paracompact smooth manifold of dimension n and let g be a Riemannian metric on $\mathcal{M}$. Show that for every $f \in C_c^\infty(\mathcal{M})$ with the property that $\operatorname{supp}(f) \subset U$ for some local chart (U, φ) in the maximal smooth atlas $\mathcal{A}$ of $\mathcal{M}$, the value $\int_{\mathcal{M}} f$ that is assigned to f by formula (2.1) of the lecture, does not depend on the particular choice of (U, φ).

Exercise 2. Let $\mathcal{M}$ be an oriented compact smooth manifold of dimension n and let g be a Riemannian metric on $\mathcal{M}$. Prove the identity

$$\langle d\overline{f} \wedge \eta, \omega \rangle_{\Omega^\bullet_{\mathbb{C}}(\mathcal{M})} = \langle \eta, df \llcorner \omega \rangle_{\Omega^\bullet_{\mathbb{C}}(\mathcal{M})}$$

for all $f \in C^\infty(\mathcal{M}, \mathbb{C})$ and all $\omega, \eta \in \Omega^\bullet_{\mathbb{C}}(\mathcal{M})$.