Institut für Algebra und Geometrie

Prof. Dr. W. Tuschmann
Dr. F. Galaz-García

Karlsruher Institut für Technologie

Global Differential Geometry

Exercise sheet 6

Exercise 1

Show that the unit tangent bundle of the 2-sphere is equivalent to $\mathrm{SO}(3) \cong \mathbb{R}P^3$.

Exercise 2

Let $\xi = (E, \pi, M, F)$ be a locally trivial fiber bundle over a smooth manifold M. Let N be another smooth manifold and $f : N \to M$ a smooth function. Show that the pullback bundle $f^*\xi$ is a locally trivial fiber bundle over N.

Exercise 3

Let $\xi = (P, \pi, M, G)$ be a principal G-bundle over M. Let N be a smooth manifold and let $f : N \to M$ be a smooth map. Show that the pullback bundle $f^*\xi$ is a principal G-bundle over N.

Exercise 4

Let G be a Lie group and $H \leq G$ a closed subgroup. Let G/H be the corresponding homogeneous space of G and let $\pi : G \to G/H$ be the quotient map. Show that $(G, \pi, G/H, H)$ is a principal H-bundle over G/H with total space G.

Due: Friday, 6.6.2014, during the exercise class.