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http://page.math.tu-berlin.de/~sullivan/L/11W/DG2/ WS 11

Differential Geometry II: Analysis and Geometry on Manifolds

Exercise Sheet 4

(flows, actions, infinitesimal generator)

due 16.11.2011

Exercise 1 **5 points**

1. Sketch for each $n \geq 0$ a flow on $\mathbb{S}^1$ with exactly n fixed points.
2. Construct a flow on $\mathbb{S}^{2n+1}$ with no fixed point.
3. Sketch a flow on $\mathbb{S}^2$ with exactly two fixed points, which admits exactly one closed orbit.

Exercise 2 **5 points**

We consider the vector field

$$X = x\frac{\partial}{\partial x} + y\frac{\partial}{\partial y}$$

on $\mathbb{R}^2$. Is there an $\mathbb{R}$–action θ for which this is the corresponding infinitesimal generator? If so, then find it!

Exercise 3 **5 points**

Show that a bounded vector field on $\mathbb{R}^n$ is the infinitesimal generator of a global flow on $\mathbb{R}^n$.