Homework 8

Topology II

Winter 2016/17

Problem 1
Let $f : S^{2n} \to S^{2n}$ be a continuous map. Prove that there is a point $x \in S^{2n}$ such that $f(x) = x$ or $f(x) = -x$. What can we conclude for continuous maps $f : \mathbb{R}P^{2n} \to \mathbb{R}P^{2n}$?

Problem 2
Hedgehog Theorem: There is no continuous nowhere vansihing vector field on S^2. This is also true in general for S^{2n}. Find such vector fields on S^{2n-1}.

Problem 3
(a) A polynomial p with complex coefficients defines a continuous map $p : \mathbb{C}P^1 \to \mathbb{C}P^1$. Show that mapping degree and degree of the polynomial are the same. Morover, show that the local degree at a root of p coincides with the multipicity of that root.