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Homotopy Theory

Summer 2015

Homework 9

Due: June 18, 2015

Problem 17

Prove the *only if* part of Problem 15) of the last exercise sheet, i.e. that i) implies ii). In contrast to the claim made in the last tutorial, this turns out to be nontrivial.

Show further: Let $\phi_i: D^n \rightarrow Y$, $i = 0, 1$ be two maps which agree on $\partial D^n = S^{n-1}$. Then they are homotopic, relative a base point $x \in \partial D^n$. Show that, in general, ϕ_i are not homotopic relative S^{n-1} .

Problem 18

Show that for every abelian group A and every $n \geq 2$, there exists a topological space X with

$$\pi_i(X) = \begin{cases} A, & \text{if } i = n \\ 0, & \text{else.} \end{cases}$$