HOMEWORK SET 1

HW1. Let X and Y be pointed spaces, assumed to be n-connected and m-connected, respectively. Show that $\pi_k(X \vee Y) \cong \pi_k(X) \times \pi_k(Y)$ for $k \leq n+m$.

HW2. Let $F \to E \to B$ be a fibration. Use that $E \to B$ has the homotopy lifting property with respect to the pair (S^n, pt) to define an action of $\pi_1(E)$ on $\pi_n(F)$, i.e. a homomorphism $\pi_1(E) \to \mathrm{Aut}(\pi_n(F))$, such that the composition $\pi_1(F) \to \pi_1(E) \to \mathrm{Aut}(\pi_n(F))$ is the usual action of $\pi_1(F)$ on $\pi_n(F)$. Deduce that if E is simply connected then $\pi_1(F)$ acts trivially on the higher homotopy groups of F.

Deadline: 2022–10–04. If you have used any resources outside the course literature/lecture notes, please indicate this in your solution. Similarly if you have discussed the problems with another student. Hand in your solutions by e-mail to: dan.petersen@math.su.se