Math 527 - Homotopy Theory
Spring 2013
Homework 5, Lecture 2/13

Problem 2. (May § 9.4 Lemma) Show that for all $n \geq 0$, the functor $\pi_n \colon \mathbf{Top}_* \to \mathbf{Set}_*$ preserves products. In other words, for all pointed spaces X and Y, there is a natural isomorphism

$$\pi_n(X \times Y) \cong \pi_n(X) \times \pi_n(Y).$$

Problem 3. (May § 9.6 Problem 1) Let X and Y be pointed spaces, and $n \geq 2$.

a. Show that the map $\pi_n(X \times Y) \to \pi_n(X \times Y, X \vee Y)$ is zero.

b. Show that there is an isomorphism

$$\pi_n(X \vee Y) \simeq \pi_n(X) \oplus \pi_n(Y) \oplus \pi_{n+1}(X \times Y, X \vee Y).$$