Math 8306, Algebraic Topology
Homework 6
Due in-class on **Monday, October 13**

1. Find all $(2,3)$-shuffles α and give formulas for the associated shuffle maps $f_\alpha : \Delta[5] \to \Delta[2] \times \Delta[3]$.

2. Find recursive formulas for $dim_{\mathbb{Z}/2} H_k((RP^2)^n; \mathbb{Z}/2)$ in terms of k and n.

3. Suppose G is a topological group and $x \in H_k(G;\mathbb{Z})$ where k is odd. Show that $x^2 = 0$ in $H_{2k}(G,\mathbb{Z})$.

4. We saw in class that $SO(3)$, the group of 3×3 matrices with determinant 1, is a topological group homeomorphic to RP^3 and so its homology has a Pontrjagin ring striucture. Show that the square of the generator of $H_1(SO(3), \mathbb{Z}/2)$ is zero. (Hint: Compare with the Pontrjagin ring in homology over $\mathbb{Z}$.)