Homework 2

January 24, 2018

(i) Compute the cohomology ring of $\mathbb{R}P^2$ and the Klein bottle K with $\mathbb{Z}_2$ coefficients as follows.

   (a) Construct $\mathbb{R}P^2$ and K by identifying various edges of the standard square.

   (b) Find a suitable triangulation of the square, and use the definition of simplicial (Δ) cohomology to compute the ring structure.

(ii) Find suitable triangulations of the closed unit disk $D^2 = \{z \in \mathbb{C} | |z| \leq 1\}$ with 2 distinct open small balls removed. Use the triangulation to compute its cohomology ring structure.

(iii) Exercises 2, 3, 7, 11 of Hatcher, Section 3.2.