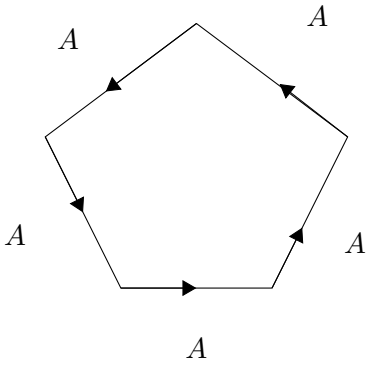
Homework 2

(1) Construct a simplicial complex homeomorphic to the
   (a) 2-sphere and
   (b) the 2-torus

   and compute the resulting homology groups.

(2) (Munkres, Chapter 6 exercise 7).
   - Construct a simplicial complex homeomorphic to the 'dunce cap' given by the pentagon with its sides identified as follows:



     Now compute its homology.
   - Do the same thing when the 5-gon above is replaced by an n-gon.

(3) (Munkres Chapter 6, exercise 8.)

   Let G_1 and G_2 be finitely generated abelian groups, where G_2 is free. Construct a simplicial complex whose pth homology group is G_p for $p = 1, 2$.

(4) Compute the homology of the boundary of an n-simplex.

   Hint: Use the fact that the reduced homology of an n-simplex is vanishes.