

Questions asked by students on 2014-01-13.

Background:

1. What is the definition of cokernel (I should know at this time)?
2. Where do simplicial complexes relate to Δ -complex structures? (i.e. visually they look the same). Then how do H_n^Δ relate to simplicial homologies
3. What is torsion?
4. Do elements of a Free Abelian Group have a unique expression?

Day of:

1. In what sense is the def. of a Δ -complex structure a “natural” def., i.e. is there an obvious deeper meaning other than “it works”?
2. (a) Can you always find a Δ -complex structure on a space?
(b) Can you create a Δ -complex structure for every space X ? [Figure omitted.]
(c) Can you always find a Δ -complex-structure? if not, when?
(d) Is it always possible to construct a Δ -complex structure? If not, what else can you do to compute H_* ?
3. What should I do if struggling to identify a Δ -complex structure?
4. How does labelling of the vertices correspond to the tiling requirement of the Δ -complex definition (as it seems to)? (in other words: why do we label the vertices?)
5. How did you jump from knowing the number of cells of a particular dimension to the chain complex? (like in the \mathbb{T}^2 example)
6. Please explain the identification space of $\mathbb{R}\mathbb{P}^2$. I didn't understand the construction with the extra node in the circle.
7. What is the connection between Smith normal form and homology groups?

Connections:

1. Is there a space X for which $H_n^\Delta(X) \neq 0 \forall n \geq 1$?
2. What is the easiest way to approach a problem involving S^3 ? How can you present the space on paper?

3. Near the beginning you mentioned how much easier homology groups are to compute than fundamental groups. Is there a way to “recover” information which we would get with π_1 but not necessarily the H_*^Δ ?
4. If 2 top. spaces have the same homology group structure, does this mean they are homeomorphic?
5. Are there any useful dualities or symmetries of the complexes obtained from taking homology groups (either in general, or more specialised cases)?
6. What is the point of working out H_n^Δ ? What does this course lead to?

Administration:

1. Will there be solutions to all the Exercises put online?