Questions asked by students in weeks nine and ten.

Background:

1. Question perhaps from a while ago: We talked a lot about there being so many more singular chains than simplicial ones. Could you please repeat why?

   ie
   $$C_n^{\Delta}(X) = \mathbb{Z}\Big[\{\sigma_\alpha \mid \dim(\Delta_\alpha) = n\}\Big]$$
   $$C_n^{\text{sing}}(X) = \mathbb{Z}\Big[\{\sigma \mid \Delta^n \to X\}\Big]$$

   I'm not sure I fully understand the difference.

2. Could you explain a little more how to show that a space is orientable? And perhaps give an ideas as to how to think about $\mathbb{RP}^4$ and show it is not?

3. When you justify a step in a proof by saying "by naturality", what exactly does that mean?

Connections:

1. All there manifolds without Δ–cpx structures? If so, how do you determine if they are orientable?

2. Of course you're bound to set us one on the exam, but in practice, do topologists ever use simplicial or Δ-homology? CW-complexes are easier to compute with and more powerful, so why ever use Δ–complexes? (No need to triangulate!)

3. Why do we use reduced homology sometimes? Is there a deeper reason than "reduced homology of a point is nice"?

Random:

1. What is [your] favourite topological space to compute the homology of?