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PROBLEM SET 2

PROBLEMS

PROBLEM 1: Review, write out that singular chains and homology are functorial.

PROBLEM 2: Check that indeed a contravariant functor $F : \mathcal{C} \to \mathcal{D}$ is the same as a covariant functor $F : \mathcal{C} \to \mathcal{D}^{op}$.

PROBLEM 3: Show that $(\mathcal{C}^{op})^{op} = \mathcal{C}$.

PROBLEM 4: Write out the details that $Hom_{\mathcal{C}}(\cdot, \cdot)$ as a functor from $\mathcal{C} \times \mathcal{C} \to Set$ is contravariant in the first variable and covariant in the second variable. This means that for fixed X the functor given on objects Y as $Hom_{\mathcal{C}}(Y, X)$ is contravariant. and the functor given on objects Y as $Hom_{\mathcal{C}}(X, Y)$ is covariant. The first step is to give the definition of the functors on morphisms.

PROBLEM 5: Check the identities for $\partial^{n,i}$ and $\sigma^{n,i}$.

PROBLEM 6: Check the identities for $d^{n,i}$, $s^{n,i}$.

PROBLEM 7: Using the identities above show that for $d = \sum_{i=1}^{n}(-1)^i d^{n,i}$, $d^2 = 0$.