

Corrections to Homework One

(4) is technically incorrect. Do you know why?

(Hint: Composition says $F(f \circ g) = F(f) \circ F(g)$.
But $=$ and \cong are different!)

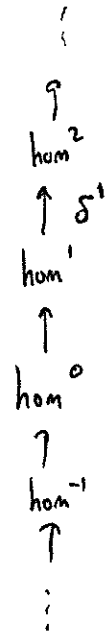
(6), (7) Either use the convention

• superscripts $\text{hom}^i(A, B) := \text{hom}(A_i, B)$

so $\delta^i : \text{hom}^i(A, B) \rightarrow \text{hom}^{i+1}(A, B)$

and set $H^i := \frac{\text{Ker } \delta^i}{\text{Image } \delta^{i-1}}$

Then prove $H^i = \begin{cases} 0 & \text{if } i \neq 0, 1 \\ \text{your solution} & i = 0, 1. \end{cases}$



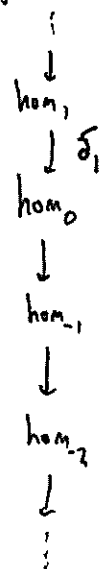
OR

• subscripts $\text{hom}_i(A, B) := \text{hom}(A_{-i}, B)$ negative sign!

so $\delta_i : \text{hom}_i(A, B) \rightarrow \text{hom}_{i-1}(A, B)$

and set (as usual) $H_i := \frac{\text{Ker } \delta_i}{\text{Image } \delta_{i+1}}$

Then prove $H_i = \begin{cases} 0 & \text{if } i \neq 0, -1 \\ \text{your solution} & i = 0 \text{ or } -1. \end{cases}$



(13) Let $F: \text{Rngs} \rightarrow \text{Groups}$ send R to its units.

Fix $n \geq 2$. Let

$G: \text{Rngs} \rightarrow \text{Groups}$

send R to $GL_n(R)$.

(a) same wording.

(b) Show $\det: GL_n(R) \rightarrow \text{units}(R)$

determines a natural transformation from G to F .