

## Exercises 1 Algebra 3

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- ① Find 3 examples of categories not in the lecture
- ② - Recall a preorder  $(X, \leq)$  is a set  $X$  with a binary rel  $\leq$  satisfying  $(x \leq x) \& (x \leq y \& y \leq z \Rightarrow x \leq z)$ .  
A preorder gives rise to a small category  $X^*$  with objects the elements of  $X$  & a (unique) morphism  $x \rightarrow y \Leftrightarrow x \leq y$ .  
- Can you construct a preorder from a small category?
- ③ Recall that a monoid  $M$  gives rise to a 1-object category  $\Sigma M$ .  
Can you construct monoid(s) from a small category?