

Assignment 2

Hand in date: Wed Sep 28

Exercise 1. Show that every poset considered as a category has equalizers and coequalizers of all pairs of morphisms.

Exercise 2. Let the functor $F : \mathbb{C} \rightarrow \mathbb{D}$ be an isomorphism of categories. Show the following.

- If \mathbb{C} has binary products so does \mathbb{D} and F preserves them.
- If \mathbb{C} has binary coproducts so does \mathbb{D} and F preserves them.
- If \mathbb{C} has equalizers so does \mathbb{D} and F preserves them.
- If \mathbb{C} has coequalizers so does \mathbb{D} and F preserves them.

Hint: You may use duality in your reasoning.

Exercise 3. Let \mathbb{C} be a category and X an object of \mathbb{C} . Show the following.

- The slice category \mathbb{C}/X always has a terminal object.
 - If \mathbb{C} has an initial object then so does \mathbb{C}/X .
 - If \mathbb{C} has equalizers so does \mathbb{C}/X .
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