Assignment 2
Hand in date: September 30, 2020

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

Exercise 2. Let the functor $F : \mathbb{C} \to \mathbb{D}$ 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 $\mathbb{C}/X$.