Assignment 2
Hand in date: September 25, 2018

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

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

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

Hint: You may use duality in your reasoning.

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

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