Definition (U endofunctor)**.** The U *endofunctor* has the form $U : \mathbf{Pos} \to \mathbf{Pos}$ and acts on objects and morphisms as follows:

1. *On objects*: Given a poset $P \in \mathrm{Ob}_{\mathbf{Pos}}$, U maps P to its upper set. {bhfn:1}
2. *On morphisms*: Given posets P, Q, and a monotone map $f : P \to Q$, the U endofunctor acts as:

$$\begin{aligned} U(f) : \mathcal{U}P &\to \mathcal{U}Q \\ P' &\mapsto \uparrow\left(\bigcup_{p \in P'} \{f(p)\}\right). \end{aligned}$$

Recall that in **??** we proved that the upper set is itself an object of **Pos**.