**Exercise 1.** Let $\eta : \mathcal{B}(\mathbb{X}) \to \mathbb{N}$ be a Poisson point process with intensity $\lambda$, i.e. $\eta(A)$ is the number of points in $A \in \mathcal{B}(\mathbb{X})$. Let $0 < p \leq 1$. Remove each point produced by the process independently with probability $1 - p$. Show that the resulting point process $\eta'$ is a Poisson point process with intensity $p\lambda$.

**Exercise 2.** Consider a finite measure space $X$ and a sequence of measurable sets $A_1, A_2 \cdots \subset X$. Show that if

$$\limsup \mu\left(A_n\right) \geq \lambda.$$

Then $\mu\left(\limsup A_i\right) \geq \lambda > 0$. *Hint: Fatou's lemma.*

**Exercise 3.** Use Karamata's representation theorem to verify the following facts for $f \in RV_\alpha$, $g \in RV_\beta$:

- If $\alpha > 0$ then $f \to \infty$, if $\alpha < 0$, then $f \to 0$ as $x \to \infty$.
- If $\alpha > \beta$ then $f/g \to \infty$.
- $f + g \in RV_{\max\{\alpha,\beta\}}$