Exercise 1. Consider a finite interval $I = [a, b] \subset \mathbb{R}$. Show that the continuity points of an increasing function $f : I \to \mathbb{R}$ are dense in I.

Exercise 2. Modes of convergence:

- Construct a sequence of random variables X_n so that $X_n \to X$ in probability, but not almost surely.
- Construct a sequence of random variables Y_n so that $Y_n \to Y$ in distribution, but not in probability.

Exercise 3. Show that if $k_n/n \to 0$, as $n \to \infty$ then $X_{(n-k_n,n)} \to \infty$ almost surely for i.i.d. X_i with an unbounded distribution.