

$$F_X(x) = \begin{cases} 0 & x < 0, \\ x^2 & x \in [0, 1], \\ 1 & x > 1. \end{cases}$$

$$\begin{aligned} P(n(1 - X_{n:n}) \leq x) &= P\left(1 - X_{n:n} \leq \frac{x}{n}\right) = P\left(1 - \frac{x}{n} \leq X_{n:n}\right) \\ &= 1 - P\left(X_{n:n} < 1 - \frac{x}{n}\right) = 1 - \left[F_X\left(1 - \frac{x}{n}\right)\right]^n = \begin{cases} 1 & x > n \\ 1 - \left(1 - \frac{x}{n}\right)^{2n} & 0 \leq x \leq n \\ 0 & x < 0 \end{cases} \end{aligned}$$

$$\rightarrow \mathbb{1}_{\{x \geq 0\}} (1 - e^{-2x})$$

$$\sim \text{EXP}\left(\frac{1}{2}\right)$$