

Practice exercises on probability: part II

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Example 1.1 *Let X, Y be independent rv with $\text{Exp}(1)$ distribution. Show that $X/(X + Y)$ and $X + Y$ are independent, and find their distributions.*

Solution

Example 1.2 *Let $X_n \sim \text{Bin}(n, \theta)$.*

- (a) Show that $X_n/n \xrightarrow{P} \theta$.*
- (b) Show that $1 - X_n/n \xrightarrow{P} 1 - \theta$.*
- (c) Show that $(X_n/n)(1 - X_n/n) \xrightarrow{P} \theta(1 - \theta)$.*

Solution