

$$\begin{array}{ccc}
X : \Omega \rightarrow \mathbb{R}^n & \xrightarrow{\Pr(X \leq x)} & F_X : \mathbb{R}^n \rightarrow [0, 1] \\
& \searrow \Pr(X \in B) & \downarrow \Delta_{a_1 b_1} \cdots \Delta_{a_n b_n} \\
& & P_X : \mathcal{B}(\mathbb{R}^n) \rightarrow [0, 1]
\end{array}$$