probability transition function

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Classification	msc 60J35
Defines	probability transition function
Defines	homogeneous probability transition function
Defines	Chapman-Kolmogorov equation

A *probability transition function* (p.t.f., or just t.f. in context) on a measurable space $(\Omega, \mathcal{F})$ is a family $P_{s,t}$, $0 \leq s < t$ of transition probabilities on $(\Omega, \mathcal{F})$ such that for every three real numbers $s < t < v$, the family the *Chapman-Kolmogorov equation*

$$\int P_{s,t}(x, dy) P_{t,v}(y, A) = P_{s,v}(x, A)$$

for every $x \in \Omega$ and $A \in \mathcal{F}$. The t.f. is said to be if $P_{s,t}$ depends on s and t only through their $t - s$. In this case, we write $P_{t,0} = P_t$ and the family $\{P_t, t \geq 0\}$ is a semigroup, and the Chapman-Kolmogorov equation reads

$$P_{t+s}(x, A) = \int P_s(x, dy) P_t(y, A).$$

References

[1] D. Revuz & M. Yor, *Continuous Martingales and Brownian Motion*, Third Edition Corrected. Volume 293, Grundlehren der mathematischen Wissenschaften. Springer, Berlin, 2005.