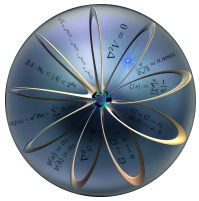

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joint discrete density function

Canonical name	JointDiscreteDensityFunction
Date of creation	2013-03-22 11:54:55
Last modified on	2013-03-22 11:54:55
Owner	mathcam (2727)
Last modified by	mathcam (2727)
Numerical id	10
Author	mathcam (2727)
Entry type	Definition
Classification	msc 60E05
Synonym	joint probability function
Synonym	joint distribution

Let $X_1, X_2, ..., X_n$ be n random variables all defined on the same probability space. The **joint discrete density function** of $X_1, X_2, ..., X_n$, denoted by $f_{X_1,X_2,...,X_n}(x_1, x_2, ..., x_n)$, is the following function:

$f_{X_1,X_2,...,X_n} : R^n \to R$
$f_{X_1,X_2,...,X_n}(x_1, x_2, ..., x_n) = P[X_1 = x_1, X_2 = x_2, ..., X_n = x_n]$

As in the single variable case, sometimes it's expressed as $p_{X_1,X_2,...,X_n}(x_1, x_2, ..., x_n)$ to mark the difference between this function and the continuous joint density function.

Also, as in the case where $n = 1$, this function satisfies:

1. $f_{X_1,X_2,...,X_n}(x_1, ..., x_n) \geq 0 \ \forall (x_1, ..., x_n)$
2. $\sum_{x_1,...,x_n} f_{X_1,X_2,...,X_n}(x_1, ..., x_n) = 1$

In this case, $f_{X_1,X_2,...,X_n}(x_1, ..., x_n) = P[X_1 = x_1, X_2 = x_2, ..., X_n = x_n]$.