

## JOINT CUMULATIVE DISTRIBUTION FUNCTIONS

## Why

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## **Definition**

Let  $X, Y: \Omega \to \mathbb{R}$  be random variables on probability space  $(\Omega, \mathcal{F}, \mathsf{P})$ . The joint cumulative distribution function denoted  $F_{X,Y}: \mathbb{R}^2 \to [0,1]$  is defined by  $F_{X,Y}(s,t) = \mathsf{P}[X \le s, Y \le t]$ .

In general the *joint cdf* for a random vector  $X : \Omega \to \mathbb{R}^n$  is  $F_X : \mathbb{R}^d \to [0,1]$  defined by  $F_X(t) = \mathbb{P}[X \le t]$  where  $x \le t$  means  $x_i \le t_i$  for all i.

<sup>&</sup>lt;sup>1</sup>Future editions will include.

