

Distribution Functions

With every random variable X , we associate a function called the cumulative distribution function of X .

The cumulative distribution function or cdf of a random variable X , denoted by $F_X(x)$, is defined by $F_X(x) = P_X(X \leq x)$ for all x .

Theorem 3: The function $F(x)$ is a cdf if and only if the following four conditions hold:

- (1) $\lim_{x \rightarrow -\infty} F(x) = 0$
- (2) $\lim_{x \rightarrow \infty} F(x) = 1$
- (3) $F(x)$ is a nondecreasing function of x .
- (4) $F(x)$ is right-continuous; that is, for every number x_0 , $\lim_{x \rightarrow x_0} F(x) = F(x_0)$