

For R.V.  $X$ ,  $F(x) = P(X \leq x)$  for all  $x \in \mathbb{R}$

For discrete  $X$ ,

$$P(X \leq x) = P(X \in (-\infty, x]) = \sum_{z \in X(\Omega), z \leq x} f(z)$$

Ex:  $X \sim \text{Bernoulli}(p)$

$$F(x) = \begin{cases} 0, & x < 0 \\ 1 - p, & 0 \leq x < 1 \\ 1, & 1 \leq x \end{cases}$$

Key properties

1.  $F$  is Nondecreasing

2.  $\lim_{x \rightarrow -\infty} F(x) = 0$

3.  $\lim_{x \rightarrow \infty} F(x) = 1$

