

Probability (mass) function(p.m.f): the probability function for **discrete** r.v. which must satisfy

- ▶ $f(x_i) \geq 0$ for all x_i
- ▶ $\sum_{i=1}^{\infty} f(x_i) = 1$

Probability density function(p.d.f): the probability function for **continuous** r.v. which must satisfy

- ▶ $f(x) \geq 0$ for all x
- ▶ $\int_{-\infty}^{\infty} f(x) = 1$

Cumulative distribution function(c.d.f):

$$F(x) = Pr(X \leq x).$$

If X is a **discrete** random variable, then

$$F(x) = \sum_{t \leq x} f(t) = \sum_{t \leq x} Pr(X = t).$$

If X is a **continuous** random variable, then

$$F(x) = \int_{-\infty}^x f(t) dt.$$

For a continuous random variable X, if the derivative exists,

$$f(x) = \frac{dF(x)}{dx}.$$