

## Continuous Random Variables:

$$X : \mathcal{S} \rightarrow \mathcal{R}$$

There exists a function  $f : \mathcal{R} \rightarrow [0, \infty)$  such that for every  $a$  and  $b$ ,

$$P(a < X < b) = \int_a^b f(x) dx$$

$f$  is called the probability density function for  $X$  and is a measure of how likely  $X$  is to be near  $x$ .

$$F(x) = P(X \leq x)$$

$$F'(x) = f(x)$$

$$E(X) = \int_{-\infty}^{\infty} x f(x) dx = \mu$$

$$\text{var } X = E(X^2) - \mu^2$$