

VARIANCE

what is the typical deviation of the RV from its mean?

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

$$\mu = E[X]$$

$$= E[X^2 - 2\mu X + \mu^2]$$

$$= E[X^2] - 2\mu E[X] + \mu^2 = \boxed{E[X^2] - E[X]^2}$$

some useful properties:

$$\textcircled{1} \text{ var}(cX) = c^2 \text{var}(X) \quad (\text{constant } c)$$

$$\textcircled{2} \text{ var}(X + c) = \text{var}(X)$$

if  $X$  and  $Y$  are independent:

$$\textcircled{3} \text{ var}(X + Y) = \text{var}(X) + \text{var}(Y)$$