


Event	X	P(X)	XP(X)	$[X - E(X)]^2$	$P(X)[X - E(X)]^2$
Heart (not ace)	1	$\frac{12}{52}$	$\frac{12}{52}$	$(1 - 0.81)^2 = 0.0361$	$\frac{12}{52} \times 0.0361 = 0.0083$
ace	5	$\frac{4}{52}$	$\frac{20}{52}$	$(5 - 0.81)^2 = 17.5561$	$\frac{4}{52} \times 17.5561 = 1.3505$
King of spades	10	$\frac{1}{52}$	$\frac{10}{52}$	$(10 - 0.81)^2 = 84.4561$	$\frac{1}{52} \times 84.4561 = 1.6242$
All else	0	$\frac{35}{52}$	0	$(0 - 0.81)^2 = 0.6561$	$\frac{35}{52} \times 0.6561 = 0.4416$

$$E(X) = \sum X P(X)$$

$$= \frac{12}{52} + \frac{20}{52} + \frac{10}{52} + 0 = \frac{42}{52} = 0.81$$

$$\text{Var}(X) = \sum [X - E(X)]^2 P(X)$$

$$= 0.0083 + 1.3505 + 1.6242 + 0.4416$$

$$= 3.4246$$

$$\text{SD}(X) = \sqrt{\text{Var}(X)} = \sqrt{3.4246} = 1.85$$

tossing a coin

Success = Head $p = \frac{1}{2}$

Failure = tail $q = 1 - p = 1 - \frac{1}{2} = \frac{1}{2}$.

x denotes Success

$$P(X=x) = p^x (1-p)^{1-x}$$

$$P(X=\text{Head}) = \left(\frac{1}{2}\right)^1 \left(\frac{1}{2}\right)^{1-1}$$

$$= \frac{1}{2}$$

$$x \quad P(x) \quad x P(x)$$

$$\text{Heads} \quad 1 \quad p \quad 1 \times p$$

$$\text{tails.} \quad 0 \quad 1-p \quad 0(1-p)$$

$$E(X) = \sum x P(x) = 1 \times p + 0(1-p) = p$$

	x	$P(x)$	$xP(x)$
H	1	p	p

T	0	$(1-p)$	0
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$$E(x) = p$$

$$\text{Var}(x) = \sum [x - E(x)]^2 P(x)$$

$$= [1 - p]^2 p + [0 - p]^2 (1 - p)$$

$$= (1 + p^2 - 2p) p + p^2 (1 - p)$$

$$= \cancel{p} + \cancel{p^3} - 2p^2 + p^2 - \cancel{p^3}$$

$$p - p^2$$

$$= p(1 - p)$$