Valor Esperado $E(X)$

$$E(X) = \sum_{i=1}^{n} x_i \, P(X=x_i)$$

Propriedades:

i) Se $X = C$ é uma constante, então $E[C] = C$.

$$E(C) = \sum_{i=1}^{\infty} C \, p(X=x_i) = C \cdot \sum_{i=1}^{\infty} p(X=x_i) = C$$

ii) $E(CX) = C\,E(X)$

$$E(CX) = \sum_{i=1}^{\infty} C x_i \, p(X=x_i) = C \sum_{i=1}^{\infty} x_i \, p(X=x_i) = C\,E(X)$$

iii) $E(aX+b) = aE(X)+b$, a e b constantes.

$$E(aX+b) = \sum_{i=1}^{\infty} (ax_i + b) P(X=x_i) = \sum_{i=1}^{\infty} a x_i \, P(X=x_i) + \sum_{i=1}^{\infty} b \, P(X=x_i) =$$

$$a \sum_{i=1}^{\infty} x_i \, P(X=x_i) + b \sum_{i=1}^{\infty} P(X=x_i) = aE(X) + b$$

Variância σ^2

$$\sigma^2 = E[(X - E(X))^2] = E(X^2) - E(X)^2$$

$$E[X^2 - 2XE(X) + E(X)^2] =$$

$$E[X^2] - E[2XE(X)] + E[E(X)^2] =$$

$$E[X^2] - 2E(X)E(X) + E(X)^2 = \text{prop. 3.}$$

$$E(X^2) - 2E(X)^2 + E(X)^2 =$$

$$E(X^2) - E(X)^2$$