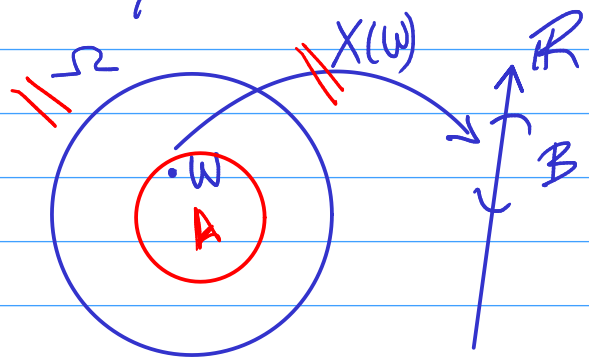
Probabilidades

Curso: Estatística e Geotecnia
CEAC/UFSJ



Variável Aleatória

- Discreta
- Contínua

$P(A) =$

Dist. Binomial

$Y = \{0, 1\}$ (0 → fracasso, 1 → sucesso) → Bernoulli

$n \Rightarrow Y_1, Y_2, \ldots, Y_n$

$0 \quad 1 \quad 1 \ldots$

$\Rightarrow X = \sum_{i=1}^{n} Y_i \sim \text{Binomial}(n, p)$

$S_X = \{0, 1, \ldots, n\}$

$X \sim \text{Bin}(n, p)$,

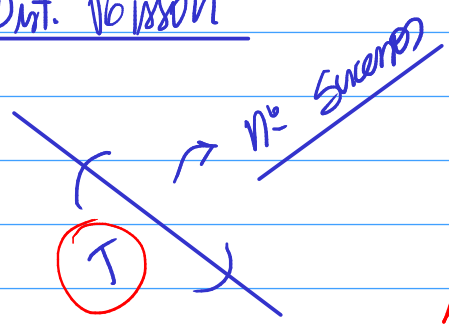
$$p_X(x) = \binom{n}{x} p^x (1-p)^{n-x}$$

$n = 10$; $p = 1/5 \Rightarrow$

$P(X = 5) = \binom{10}{5} (1/5)^5 (4/5)^5 =$

$P(X \leq 3) = F_X(3) = \sum_{x=0}^{3} p_X(x) =$

Dist. Poisson



$X \sim Pois(\lambda)$

$\lambda = 3ac / 5km$

$P(X = 2ac / 3km) = ?$

$S_X = \{0, 1, \dots\}$

$$p_X(x) = \frac{\lambda^x \cdot e^{-\lambda}}{x!}$$

$$p_X(2) = \frac{3^2 \cdot e^{-3}}{2!} =$$

ii) $\lambda^* \text{ — } 3km$ $\quad \lambda^* = 9/5 \; ac / 3km$

$3 \text{ — } 5km$

$$p_X(2) = \frac{(9/5)^2 \, e^{-(9/5)}}{2!} =$$

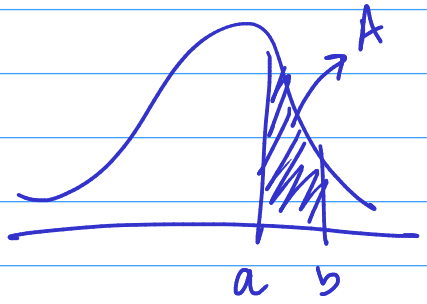
$$P(X > 3) = P(X=4) + P(X=5) + \dots$$

$$= 1 - [P(X=0) + P(X=1) + P(X=2) + P(X=3)]$$

$$X \sim N(\mu, \sigma^2)$$

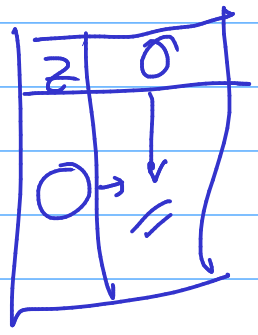
$$f_X(x;\mu,\sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} \times e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

$$S_X = [-\infty, +\infty] \; ; \quad \mu \in \mathbb{R} \; ; \quad \sigma^2 \in \mathbb{R}^+$$



$$A = \int_a^b f_X(x)\,dx$$

$$X \rightarrow Z = \frac{X-\mu}{\sigma} \Rightarrow Z \sim N(0,1)$$

$$f_Z(z) = \frac{1}{\sqrt{2\pi}} \times e^{-\frac{1}{2}z^2}$$

$$P(a \leq Z \leq b) = \int_a^b f_Z(z)\,dz$$