APLICAÇÃO DO TEOREMA 26

$$Pr\Big(\underbrace{\boxed{|\hat{\mu}-\mu| \le \tfrac{1}{5}\sigma}}_{E_1} \ \text{e}\ \underbrace{\boxed{|\hat{\sigma}-\sigma| \le \tfrac{1}{5}\sigma}}_{E_2}\Big) \geq \frac{1}{2}$$

SEJA $U := \dfrac{n\hat{\sigma}^2}{\sigma^2} = \dfrac{26\ \hat{\sigma}^2}{\sigma^2}$

ONDE

- $\hat{\sigma}^2 = \dfrac{1}{26} \displaystyle\sum_{i=1}^{26} (X_i - \overline{X}_{26})^2$
- $\overline{X}_{26} = \dfrac{1}{26} \displaystyle\sum_{i=1}^{26} X_i$

$$Pr(E_1 \text{ e } E_2) \geq \frac{1}{2}$$

$$\underbrace{Pr(E_1)}_{P_1}\ \underbrace{Pr(E_2)}_{P_2} \geq \frac{1}{2}$$

$$P_1(n) = Pr\left(|\hat{\mu} - \mu| < \frac{1}{5}\sigma\right)$$

$$= Pr\left(\frac{|\hat{\mu} - \mu|}{\sigma} < \frac{1}{5}\right)$$

$$= Pr\left(\frac{\sqrt{n}\,|\hat{\mu} - \mu|}{\sigma} < \sqrt{n}\,\frac{1}{5}\right)$$

$$U = \frac{n(\hat{\mu} - \mu)^2}{\sigma^2}$$

- $P_2(n) = Pr\left(U < \frac{n}{25}\right)$

$U \sim$ QUI-QUADRADO (1).

$$P_2(n) = \Pr\left(|\hat{\sigma} - \sigma| \le \frac{1}{5}\sigma\right)$$

$$\hat{\sigma}^2 = \frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X}_n)^2$$

$$\hat{\sigma} = \sqrt{\hat{\sigma}^2}$$

$$\hat{\sigma} = \sqrt{\frac{\sum (X_i - X_n)^2}{n}}$$

$$= \frac{1}{\sqrt{n}}\sqrt{\sum_{i=1}^{n}(X_i - X_n)^2}$$

$$P_2(n) = \Pr\left(\frac{|\hat{\sigma} - \sigma|}{\sigma} < \frac{1}{5}\right)$$

$$= \Pr\left(-\frac{1}{5} < \frac{\hat{\sigma} - \sigma}{\sigma} < \frac{1}{5}\right)$$

$$= \Pr\left(0.8 < \frac{\hat{\sigma}}{\sigma} < 1.2\right)$$

$$= \Pr\left(\sqrt{n}\,0.8 < \frac{\sqrt{n}\,\hat{\sigma}}{\sigma} < 1.2\sqrt{n}\right)$$

$$= \Pr\left(0.64n < \boxed{\frac{n\hat{\sigma}^2}{\sigma^2}} < 1.44n\right)$$

$$\boxed{V = \frac{n\hat{\sigma}^2}{\sigma^2}} \sim \text{QUI-QUADRADO}_{(n-1)}$$

- $P_2(n) = Pr\left(0.64n < V < 1.44n\right)$

$$\underline{P_1(n)}\;\underline{P_2(n)} \geq \frac{1}{2}$$

$$Pr\left(V < \frac{\sqrt{n}}{5}\right)\left\{Pr\left(V < 1.44n\right) - Pr\left(V < 0.64n\right)\right\}$$

$$\geq \frac{1}{2}$$