$$\bar{x} = \frac{\sum_{i=1}^{k} (x_i \cdot f_i)}{n} \qquad s^2 = \frac{\sum_{i=1}^{k} (x_i - \bar{x})^2 \cdot f_i}{n} = \frac{\sum_{i=1}^{k} x_i^2 \cdot f_i}{n} - \bar{x}^2$$

$$Mo = l_i + \frac{f_i - f_{i-1}}{(f_i - f_{i-1}) + (f_i - f_{i+1})} \cdot d_i \qquad Me: \left\{ \begin{array}{l} F_{i-1} \le \frac{n}{2} \; ; \; Me = \frac{x_i + x_{i+1}}{2} \\ F_i > \frac{n}{2} \; ; \; Me = l_i + \frac{n/2 - F_i}{f_i - 1} \cdot d_i \end{array} \right\}$$

$$C_\alpha : \left\{ \begin{array}{l} F_{i-1} \le \frac{\alpha \cdot n}{*} \; ; \; * \in [\cancel{X}, 4, 10, 100] \\ F_i > \frac{\alpha \cdot n}{*} \; ; \; C_\alpha = l_i + \frac{\frac{\alpha \cdot n}{*} - F_{i-1}}{f_i} \cdot d_i \end{array} \right\}$$

$$V_{n,s} = \frac{n!}{(n-s)!} \qquad VR_{n,s} = n^s \qquad P_n = n! \qquad P_n^{n_1! n_2! n_3!} = \frac{n!}{n_1! \, n_2! \, n_3!}$$

$$C_{n,s} = \binom{n}{s} = \frac{n!}{(n-s)! \, s!} \qquad CR_{n,s} = \binom{n+s-1}{s} = \frac{(n+s-1)!}{(n-1)! \, s!}$$

Probabilidad Total: $P(A) = P(A \cap B) + P(A \cap C) = P(A|B) \cdot P(B) + P(A|C) \cdot P(C)$

Teorema Bayes: $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{P(B|A) \cdot P(A)}{P(B)}$

Variables discretas:

- UNIFORME: $\frac{1}{n}$; $\frac{1}{n} \sum_{i=1}^{k} (x_i)$; $\frac{1}{n} \sum_{i=1}^{k} x_i^2 - \mu^2$
- BERNOULLI: $p^x \cdot (1-p)^{1-x}$; p ; pq
- BINOMIAL: $\binom{n}{x} p^x \cdot (1-p)^{n-x}$; np ; npq
- GEOMÉTRICA: $q^x \cdot p$; $\frac{q}{p}$; $\frac{q}{p^2}$
- B. NEGATIVA: $\binom{n+x-1}{x} \cdot q^x \cdot p^n$; $\frac{nq}{p}$; $\frac{nq}{p^2}$
- HIPERGEOMÉTRICA: $\frac{\binom{Np}{x}\binom{Nq}{n-x}}{\binom{N}{n}}$; np ; $npq \cdot \frac{N-n}{N-1}$
- POISSON: $\frac{e^{-\lambda} \cdot \lambda^x}{x!}$; λ ; λ

BINOMIAL → POISSON $\left\{ \begin{array}{l} np \le 5 \\ p \le 0'1 \end{array} \right\}$ HYPER → BINOMIAL $\{ N > 10 \cdot n \}$

Variables continuas:

- UNIFORME: $\frac{1}{b-a}$; $\frac{x-a}{b-a}$; $\frac{(a+b)}{2}$; $\frac{(b-a)^2}{12}$
- EXPONENCIAL: $\frac{1}{\beta} \cdot e^{-x/\beta}$; $1 - e^{-x/\beta}$; β ; β^2

BINOMIAL → NORMAL $\left\{ \begin{array}{l} np \ge 5 \\ nq \ge 5 \end{array} \right\}$

POISSON → NORMAL $\{ \lambda > 18 \}$

Tema 5:

$\boxed{\mu}$

- Normal σ conocida
$$\frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(\overset{0}{\mu}, \overset{1}{\sigma/\sqrt{n}}) \qquad I_{\mu}^{1-\alpha} = \left[\bar{x} \mp z_{\alpha/2} \cdot \sigma/\sqrt{n}\right]$$

- Normal σ desconocida
$$\frac{\bar{X}-\mu}{S/\sqrt{n}} \sim t_{n-1} \qquad I_{\mu}^{1-\alpha} = \left[\bar{x} \mp t_{n-1;\alpha/2} \cdot S/\sqrt{n}\right]$$

- Cualquiera σ conocida $n > 30$
$$\frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(\overset{0}{\mu}, \overset{1}{\sigma/\sqrt{n}}) \qquad I_{\mu}^{1-\alpha} = \left[\bar{x} \mp z_{\alpha/2} \cdot \sigma/\sqrt{n}\right]$$

- Cualquiera σ desconocida $n > 100$
$$\frac{\bar{X}-\mu}{S/\sqrt{n}} \sim N(\overset{0}{\mu}, \overset{1}{S/\sqrt{n}}) \qquad I_{\mu}^{1-\alpha} = \left[\bar{x} \mp z_{\alpha/2} \cdot S/\sqrt{n}\right]$$

$\boxed{\mu_1-\mu_2}$

- Normales independientes σ_1, σ_2 conocidas
$$\frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{\sigma_1^2}{n}+\frac{\sigma_2^2}{m}}} \sim N\left(\overset{0}{\mu_1-\mu_2}, \overset{1}{\sqrt{\frac{\sigma_1^2}{n}+\frac{\sigma_2^2}{m}}}\right)$$
$$I_{\mu_1-\mu_2}^{1-\alpha} = \left[(\bar{x}_1-\bar{x}_2) \mp z_{\alpha/2} \cdot \sqrt{\frac{\sigma_1^2}{n}+\frac{\sigma_2^2}{m}}\right]$$

- Normales independientes σ_1, σ_2 desconocidas $=$
$$\frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\underbrace{\sqrt{\frac{(n-1)S_1^2+(m-1)S_2^2}{n+m-2}}\sqrt{\frac{1}{m}+\frac{1}{n}}}_{W}} \sim t_{n+m-2}$$
$$I_{\mu_1-\mu_2}^{1-\alpha} = \left[(\bar{x}_1-\bar{x}_2) \mp t_{n+m-2;\alpha/2} \cdot W\right]$$

- Normales independientes σ_1, σ_2 desconocidas $\neq$
$$\frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{S_1^2}{n}+\frac{S_2^2}{m}}} \sim t_v \qquad v = \frac{\left(\frac{S_1^2}{n}+\frac{S_2^2}{m}\right)^2}{\frac{\left(\frac{S_1^2}{n}\right)^2}{n+1}+\frac{\left(\frac{S_2^2}{m}\right)^2}{m+1}} - 2$$
$$I_{\mu_1-\mu_2}^{1-\alpha} = \left[(\bar{x}_1-\bar{x}_2) \mp t_{v;\frac{\alpha}{2}} \cdot \sqrt{\frac{S_1^2}{n}+\frac{S_2^2}{m}}\right]$$

- Cualquiera independientes σ_1, σ_2 conocidas $n, m > 15$
$$N\left(\mu_1-\mu_2, \sqrt{\frac{\sigma_1^2}{n}+\frac{\sigma_2^2}{m}}\right)$$

- Cualquiera independientes σ_1, σ_2 desconocidas $n, m > 100$
$$N\left(\mu_1-\mu_2, \sqrt{\frac{S_1^2}{n}+\frac{S_2^2}{m}}\right)$$

$\boxed{\sigma^2}$

- Normal, μ conocida

$$\frac{\sum_{i=1}^{n}(x_i-\mu)^2}{\sigma^2} \sim \chi^2_n \qquad I^{1-\alpha}_{\sigma^2} = \left[\frac{\sum_{i=1}^{n}(x_i-\mu)^2}{\chi^2_{n;1-\alpha/2}}, \frac{\sum_{i=1}^{n}(x_i-\mu)^2}{\chi^2_{n;\alpha/2}}\right]$$

- Normal, μ desconocida

$$\frac{(n-1)S^2}{\sigma^2} = \frac{ns^2}{\sigma^2} \sim \chi^2_{n-1}$$

$$I^{1-\alpha}_{\sigma^2} = \left[\frac{ns^2}{\chi^2_{n-1;1-\alpha/2}}, \frac{ns^2}{\chi^2_{n-1;\alpha/2}}\right]$$

$\boxed{S_1^2/S_2^2}$

$$\frac{S_1^2/\sigma_1^2}{S_2^2/\sigma_2^2} \sim F_{n-1;m-1}$$

$$P\Bigg(\underbrace{F_{n-1;m-1;1-\alpha/2}}_{F_1} \le \frac{S_1^2/\sigma_1^2}{S_2^2/\sigma_2^2} \le \underbrace{F_{n-1;m-1;\alpha/2}}_{F_2}\Bigg) =$$

$$= P\left(F_1 \cdot \frac{S_2^2}{\sigma_2^2} \le \frac{S_1^2}{\sigma_1^2} \le F_2 \cdot \frac{S_2^2}{\sigma_2^2}\right) = P\left(\frac{S_1^2}{F_1 \cdot S_2^2} \le \frac{\sigma_1^2}{\sigma_2^2} \le \frac{S_1^2}{F_2 \cdot S_2^2}\right)$$

$$I^{1-\alpha}_{\sigma_1^2/\sigma_2^2} = \left[\frac{S_1^2}{F_{n-1;m-1;1-\alpha/2} \cdot S_2^2}, \frac{S_1^2}{F_{n-1;m-1;\alpha/2} \cdot S_2^2}\right]$$

$\boxed{P}$

$$\hat{p} \sim N\left(p, \sqrt{\frac{pq}{n}}\right)$$

$$I^{1-\alpha}_{p} = \left[\hat{p} \mp z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}\hat{q}}{n}}\right]$$

$\boxed{P_1 - P_2}$

$$\hat{p}_1 - \hat{p}_2 \sim N\left(p_1 - p_2, \sqrt{\frac{p_1q_1}{n} + \frac{p_2q_2}{m}}\right)$$

$$I^{1-\alpha}_{p_1-p_2} = \left[(\hat{p}_1 - \hat{p}_2) \mp z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}_1\hat{q}_1}{n} + \frac{\hat{p}_2\hat{q}_2}{m}}\right]$$