EPE

ALUMNO ---

MATERIAL PARA LOS CURSOS DE ESTADÍSTICA DE EPE DE LA UPC

Resumen	**Muestra**			**Población**		
Promedio o media	$\bar{x}=\frac{\sum_{i=1}^{n} x_i}{n}$	$\bar{x}=\frac{\sum_{i=1}^{k} f_i x_i}{n}$ datos agrupados	$\bar{x}=\frac{\sum_{i=1}^{k} f_i x_i'}{n}$ datos agrupados con intervalos	$\mu=\frac{\sum_{i=1}^{N} x_i}{N}$	$\mu=\frac{\sum_{i=1}^{k} f_i x_i}{N}$	$\mu=\frac{\sum_{i=1}^{k} f_i x_i'}{N}$
Promedio ponderado	$\bar{x}_w=\frac{\sum_{i=1}^{k} w_i x_i}{\sum_{i=1}^{k} w_i}$			$\mu_w=\frac{\sum_{i=1}^{k} w_i x_i}{\sum_{i=1}^{k} w_i}$		
Varianza	$S^2=\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}$	$S^2=\frac{\sum_{i=1}^{k} f_i(x_i-\bar{x})^2}{n-1}$ datos agrupados	$s^2=\frac{\sum_{i=1}^{k} f_i(x_i'-\bar{x})^2}{n-1}$ datos agrupados con intervalos	$\sigma^2=\frac{\sum_{i=1}^{N}(x_i-\mu)^2}{N}$	$\sigma^2=\frac{\sum_{i=1}^{k} f_i(x_i-\mu)^2}{N}$	$\sigma^2=\frac{\sum_{i=1}^{k} f_i(x_i'-\mu)^2}{N}$

Resumen	**Muestra**			**Población**		
Desviación estándar	$s=\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}}$	$s=\sqrt{\frac{\sum_{i=1}^{k} f_i(x_i-\bar{x})^2}{n-1}}$	$s=\sqrt{\frac{\sum_{i=1}^{k} f_i(x_i'-\bar{x})^2}{n-1}}$	$\sigma=\sqrt{\frac{\sum_{i=1}^{N}(x_i-\mu)^2}{N}}$	$\sigma=\sqrt{\frac{\sum_{i=1}^{k} f_i(x_i-\mu)^2}{N}}$	$\sigma=\sqrt{\frac{\sum_{i=1}^{k} f_i(x_i'-\mu)^2}{N}}$
Coeficiente de variación	$CV=\left(\frac{s}{\bar{x}}\right)x100\%$			$CV=\left(\frac{\sigma}{\mu}\right)x100\%$		
Sturges	$k=1+3.322\log_{10} n$					

TEORÍA DE PROBABILIDAD	
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \cup B) = P(A) + P(B), \quad (A \cap B) \equiv \phi$	**Probabilidad total** $P(A_1)P(E/A_1) + \ldots + P(A_K)P(E/A_K)$
Teorema de Bayes $P(A_i / E) = \dfrac{P(A_i)P(E/A_i)}{P(A_1)P(E/A_1) + \ldots + P(A_K)P(E/A_K)}$ $i = 1,2,\ldots,k$	
Leyes de Morgan $P(A' \cup B') = P[(A \cap B)']$ $P(A' \cap B') = P[(A \cup B)']$	
Probabilidad condicional $P(A \mid B) = \dfrac{P(A \cap B)}{P(B)}, \quad P(B) \neq 0$ **Eventos independientes** $P(A \mid B) = P(A)$ $P(A \cap B) = P(A).P(B)$	

VARIABLE ALEATORIA				
Esperado	$\mu_x = E(X) = \sum_{i=1}^{n} x_i p_i$	$\mu_x = E(X) = \int_{-\infty}^{+\infty} x_i . f(x) dx$		Si $X_1, X_2, X_3, \ldots, X_n$ son *n* variables aleatorias independientes, y $a_1, a_2, a_3, \ldots, a_n$ son *n* constantes, entonces: $E\left(\sum_{i=1}^{n} a_i X_i\right) = \sum_{i=1}^{n} a_i . E(X_i)$
Varianza	$\sigma_x^2 = V(X) = \sum_{i=1}^{n} f_i (x_i - \mu_x)^2$ $\sigma_x^2 = V(X) = E(X^2) - [E(X)]^2$	$\sigma_x^2 = V(X) = \int_{-\infty}^{+\infty} (x_i - \mu_x)^2 . f(x) dx$ $\sigma_x^2 = V(X) = E(X^2) - [E(X)]^2$		Si $X_1, X_2, X_3, \ldots, X_n$ son *n* variables aleatorias independientes, y $a_1, a_2, a_3, \ldots, a_n$ son *n* constantes, entonces: $V\left(\sum_{i=1}^{n} a_i X_i\right) = \sum_{i=1}^{n} a_i^2 . V(X_i)$

DISTRIBUCIONES IMPORTANTES				
Binomial	$X \sim B(n,p)$	$P(X=x)=C_x^n p^x (1-p)^{n-x} \quad x=0,1,\ldots,n$	$E(X)=np$	$V(X)=np(1-p)$
Poisson	$X \sim P(\lambda)$	$P(X=x)=\dfrac{e^{-\lambda}.\lambda^x}{x!} \quad x=0,1,2,\ldots$	$E(X)=\lambda$	$V(X)=\lambda$
Normal	$X \sim N(\mu,\sigma^2)$	$f(x)=\dfrac{1}{\sqrt{2\pi}\,\sigma}e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}, \quad -\infty<x<\infty$	$E(X)=\mu$	$V(X)=\sigma^2$
Exponencial	$X \sim E(1/\beta)$	$f(x)=\dfrac{1}{\beta}e^{-\frac{x}{\beta}}, \quad x>0$, donde $\beta>0$ **Función acumulada**: $F(x)=1-e^{-\frac{x}{\beta}}$	$E(X)=\beta$	$V(X)=\beta^2$

Propiedad reproductiva de la normal.

$$\text{Si} \quad Y=\sum_{i=1}^{n} c_i x_i, \quad \text{donde} \quad x_i \sim N(\mu_i,\sigma_i^2) \quad i=1,2,\ldots,n, \quad \mu_y=\sum_{i=1}^{n} c_i\mu_i \quad \text{y} \quad \sigma_y^2=\sum_{i=1}^{n} c_i^2\sigma_i^2 \quad \rightarrow Y \sim N(\mu_y,\sigma_y^2)$$