Probabilidad y Estadística

Hoja de fórmulas que será entregada en el examen

1. $X \sim$ Binomial(n,p), $\quad p_X(k) = \binom{n}{k} p^k (1-p)^{n-k}$, $\quad E(X) = np$, $\quad V(X) = np(1-p)$
2. $X \sim$ Geométrica(p), $\quad p_X(k) = p(1-p)^{k-1}$, $\quad E(X) = \frac{1}{p}$, $\quad V(X) = \frac{1-p}{p^2}$
3. $X \sim$ Binomial Negativa(r,p), $\quad p_X(k) = \binom{k-1}{r-1} p^r (1-p)^{k-r}$, $\quad E(X) = \frac{r}{p}$, $\quad V(X) = \frac{r(1-p)}{p^2}$
4. $X \sim$ Poisson(λ), $\quad p_X(k) = \frac{e^{-\lambda}\lambda^k}{k!}$, $\quad E(X) = \lambda$, $\quad V(X) = \lambda$
5. $X \sim$ Uniforme (a,b), $\quad f_X(k) = \begin{cases} \frac{1}{b-a} & \text{si } k \in (a,b) \\ 0 & \text{si } k \notin (a,b) \end{cases}$ $\quad E(X) = \frac{a+b}{2}$, $\quad V(X) = \frac{(b-a)^2}{12}$
6. $X \sim$ Normal(μ, σ^2), $\quad f_X(k) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{\frac{-(k-\mu)^2}{2\sigma^2}}$, $\quad E(X) = \mu$, $\quad V(X) = \sigma^2$

TEOREMA
Si $X_1, \cdots, X_n$ son i.i.d. con $X_i \sim$ Normal(μ, σ^2) entonces

- $\dfrac{\overline{X} - \mu}{\frac{\sigma}{\sqrt{n}}} \sim$ Normal$(0,1)$
- $\dfrac{\overline{X} - \mu}{\frac{S}{\sqrt{n}}} \sim T_{n-1}$
- $\dfrac{(n-1)S^2}{\sigma^2} \sim \chi^2_{n-1}$

donde $S^2 = \frac{1}{n-1}\sum_{i=1}^n (X_i - \overline{X})^2$ y $\overline{X} = \frac{1}{n}\sum_{i=1}^n X_i$.