Modelos Probabilísticos Discretos y Continuos

- $X \sim \mathscr{B}(n,p)$

$$p(x) = \binom{n}{x} p^x (1-p)^{n-x};\ \text{si } x \le n; \quad E(X) = np; \quad Var(X) = np(1-p).$$

- $\mathbf{X} = (X_1; X_2; \ldots; X_k) \sim \mathscr{M}_k(p_1, p_2, \ldots, p_k, n)$

$$P(X_1 = r_1; X_2 = r_2; \ldots; X_k = r_k) = \frac{n!}{r_1! r_2! \ldots r_k!} p_1^{r_1} \ldots p_k^{r_k}; \quad r_1 + r_2 + \ldots + r_k = n$$

$$E(X_i) = np_i; \quad Var(X_i) = np_i(1-p_i); \quad Cov\left(X_i; X_j\right) = -np_i p_j.$$

- $X \sim G(p)$

$$p(x) = (1-p)^{x-1} p; \quad E(X) = 1/p; \quad Var(X) = (1-p)/p^2.$$

- $X \sim BN(p,r)$

$$p(x) = \binom{x-1}{r-1} (1-p)^{x-r} p^r; \quad E(X) = r/p; \quad Var(X) = r(1-p)/p^2.$$

- $X \sim h(N, n_1, n)$

$$P(X = r) = \frac{\binom{n_1}{r}\binom{N-n_1}{n-r}}{\binom{N}{n}}; \quad E(X) = n \cdot \frac{n_1}{N}; \quad Var(X) = \frac{N-n}{N-1} \cdot n \cdot \frac{n_1}{N} \cdot \left(1 - \frac{n_1}{N}\right)$$

- $X \sim \mathscr{P}(\lambda)$

$$P(X = r) = \frac{\lambda^r}{r!} e^{-\lambda}; \quad E(X) = Var(X) = \lambda.$$

- $X \sim U(a; b)$

$$f(x) = \frac{1}{b-a}; \quad F(x) = \frac{x-a}{b-a}, a \le x \le b; \quad E(X) = \frac{a+b}{2}; \quad Var(x) = \frac{(b-a)^2}{12}$$

- $X \sim \mathscr{E}(\alpha)$

$$f(x) = \alpha e^{-\alpha x}; \quad F(x) = 1 - e^{-\alpha x}, x \ge 0; \quad E(X) = \frac{1}{\alpha}; \quad Var(x) = \frac{1}{\alpha^2}.$$

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

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\dfrac{(x-\mu)^2}{2\sigma^2}}; \quad E(X) = \mu; \quad Var(x) = \sigma^2$$