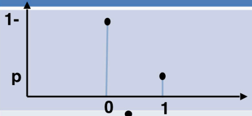
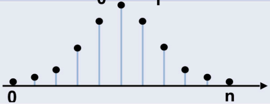
Standard Probability Distributions

Distribution	Parameter & Notation	PDF or PMF	Mean	Variance	Illustration
Bernoulli distribution (Discrete)	$X \sim \text{Ber}(p)$ $0 \le p \le 1$	$p_X(k) = p^k(1-p)^{1-k}$	$\mathbb{E}[X] = p$	$\text{Var}(X) = p(1-p)$	
Binomial distribution (Discrete)	$X \sim \text{Bin}(n, p)$ $n \in \mathbb{N}, p \in [0,1]$	$p_X(k) = \binom{n}{k} p^k (1-p)^{n-k}$	$\mathbb{E}[X] = n \cdot p$	$\text{Var}(X) = np(1-p)$	
Uniform distribution (Continuous)	$X \sim U(a, b)$ $-\infty < a < b < \infty$	$f_X(x) = \begin{cases} \frac{1}{(b-a)} & x \in [a, b] \\ 0 & \text{else} \end{cases}$	$\mathbb{E}[X] = \frac{1}{2}(a+b)$	$\text{Var}(X) = \frac{1}{12}(b-a)^2$	
Normal distribution (Continuous)	$X \sim \mathcal{N}(\mu, \sigma^2)$ $\mu \in \mathbb{R}, \sigma^2 \in \mathbb{R}_{\ge 0}$	$f_X(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$	$\mathbb{E}[X] = \mu$	$\text{Var}(X) = \sigma^2$