

MA 581 Exam 1 Formula Sheet

Bernoulli Distribution: $X \sim \text{Bern}(p)$

$$p_X(x) = \begin{cases} p^x(1-p)^{1-x} & \text{if } x = 0, 1 \\ 0 & \text{otherwise} \end{cases}$$

Binomial Distribution: $X \sim \text{Bin}(n, p)$

$$p_X(x) = \begin{cases} \binom{n}{x} p^x (1-p)^{n-x} & \text{if } x = 0, 1, \dots, n \\ 0 & \text{otherwise} \end{cases}$$

Hypergeometric Distribution: $X \sim H(N, n, p)$

$$p_X(x) = \begin{cases} \frac{\binom{Np}{x} \binom{N(1-p)}{n-x}}{\binom{N}{n}} & \text{if } x = 0, 1, \dots, n \\ 0 & \text{otherwise} \end{cases}$$

Poisson Distribution: $X \sim \text{Pois}(\lambda)$

$$p_X(x) = \begin{cases} e^{-\lambda} \frac{\lambda^x}{x!} & \text{if } x = 0, 1, \dots \\ 0 & \text{otherwise} \end{cases}$$

Geometric Distribution: $X \sim \text{Geo}(p)$

$$p_X(x) = \begin{cases} p(1-p)^{x-1} & \text{if } x = 1, 2, \dots \\ 0 & \text{otherwise} \end{cases}$$

Indicator Distribution:

$$p_{I_E}(x) = \begin{cases} 1 - P(E), & \text{if } x = 0 \\ P(E), & \text{if } x = 1 \\ 0 & \text{otherwise} \end{cases}$$

Discrete Uniform Distribution:

$$p_X(x) = \begin{cases} \frac{1}{N(S)}, & \text{if } x \in S \\ 0 & \text{otherwise} \end{cases}$$

Negative Binomial Distribution: $X \sim \text{NB}(r, p)$

$$p_X(x) = \begin{cases} \binom{x-1}{r-1} p^r (1-p)^{x-r} & \text{if } x = r, r+1, \dots \\ 0 & \text{otherwise} \end{cases}$$