

$$Pr\{X = k\} = \binom{n}{k} p^k (1-p)^{(n-k)} \quad (1)$$

$$E[X] = \sum_{k=0}^n k Pr\{X = k\} \quad (2)$$

$$E[X] = \sum_{k=0}^n k \binom{n}{k} p^k (1-p)^{(n-k)} \quad (3)$$

$$E[X] = \sum_{k=0}^n k \frac{n!}{k!(n-k)!} p^k (1-p)^{(n-k)} \quad (4)$$

$$E[X] = \sum_{k=0}^n \frac{n!}{(k-1)!(n-k)!} p^k (1-p)^{(n-k)} \quad (5)$$

$$E[X] = np \sum_{k=0}^n \frac{(n-1)!}{(k-1)!(n-k)!} p^{(k-1)} (1-p)^{(n-k)} \quad (6)$$

$$E[X] = np \sum_{k=0}^n \frac{(n-1)!}{(k-1)!((n-1)-(k-1))!} p^{(k-1)} (1-p)^{((n-1)-(k-1))} \quad (7)$$

$$E[X] = np \sum_{k=0}^n \binom{n-1}{k-1} p^{(k-1)} (1-p)^{((n-1)-(k-1))} \quad (8)$$