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

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

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