The expected value of the binomial

$$b(k) = b_n(k;p) = \binom{n}{k} p^k q^{n-k} \qquad (k = 0, 1, \ldots, n)$$

$$\mu = 0 \cdot b(0) + 1 \cdot b(1) + \cdots + k \cdot b(k) + \cdots + n \cdot b(n)$$

$$k \cdot b_n(k;p) = np \cdot b_{n-1}(k-1;p)$$

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Normalisation: $\sum_k b_{n-1}(k-1;p) = 1$

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If $S_n \sim \text{Binomial}(n, p)$, then $\mathsf{E}(S_n) := \mu = np$.