

Summary

- Let X_1, X_2, \dots, X_n be iid, and

$$\mathbb{P}(X_i = 1) = p, \quad \mathbb{P}(X_i = 0) = q = 1 - p,$$

then $X_1 + X_2 + \dots + X_n = \text{Bin}(n, p)$.

- Let

$$f(t) = \mathbb{P}(X_1 = 1) \cdot t + \mathbb{P}(X_1 = 0),$$

- Then

$$(f(t))^n = \sum_{k=0}^n [\mathbb{P}(\text{Bin}(n, p) = k)] t^k.$$

So...

... adding R.V.s is something like multiplying polynomials maybe???