BINOMIAL IDENTITIES

$$(x+y)^n = \binom{n}{0} x^n y^0 + \binom{n}{1} x^{n-1} y^1 + \cdots + \binom{n}{n} x^0 y^n$$

$$\binom{n}{m} + \binom{n-1}{m-1} + \cdots + \binom{n-m}{0} = \binom{n+1}{m}$$

$$\binom{n}{0} + \binom{n}{1} + \cdots + \binom{n}{n} = 2^n$$

$$n \cdot 2^{n-1} = 0 \cdot \binom{n}{0} + 1 \cdot \binom{n}{1} + 2 \cdot \binom{n}{2} + \cdots + n \cdot \binom{n}{n}$$

$$\binom{n+k+1}{k} = \binom{n}{0} + \binom{n+1}{1} + \cdots + \binom{n+k}{k}$$

$$\frac{1}{n+1}(2^{n+1}-1) = \binom{n}{0} + \frac{1}{2}\binom{n}{1} + \cdots + \frac{1}{n+1}\binom{n}{n}$$

$$k \cdot \binom{n}{k} = n \cdot \binom{n-1}{k-1}$$

$$\binom{n}{m}\binom{m}{k} = \binom{n}{k}\binom{n-k}{m-k}$$

$$\binom{n}{k} = \binom{n}{n-k}$$

$$F_n = \binom{n}{0} + \binom{n-1}{1} + \cdots + \binom{n - \lfloor \frac{n}{2} \rfloor}{\lfloor \frac{n}{2} \rfloor}$$

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