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Negative Binomial Series

The series which arises in the binomial theorem for negative integer $-n$,

$$(x+a)^{-n} = \sum_{k=0}^{\infty} \binom{-n}{k} x^k a^{-n-k} \quad (1)$$

$$= \sum_{k=0}^{\infty} (-1)^k \binom{n+k-1}{k} x^k a^{-n-k} \quad (2)$$

for $|x| < a$.

For $a = 1$, the negative binomial series simplifies to

$$(x+1)^{-n} = 1 - nx + \frac{1}{2} n(n+1) x^2 - \frac{1}{6} n(n+1)(n+2) x^3 + \ldots. \quad (3)$$

SEE ALSO:
Binomial Series, Binomial Theorem

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