

The *binomial theorem* specifies how we can expand expressions of the form $(x + y)^n$.

In the case that n is a positive integer, it takes the form

$$\begin{aligned}(x + y)^n &= \sum_{i=0}^n \binom{n}{i} x^i y^{n-i} \\ &= x^n + nx^{n-1}y + \binom{n}{2}x^{n-2}y^2 + \dots + y^n.\end{aligned}$$

In the general case, where n is not necessarily a positive integer, we have

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \dots$$

whenever $|x| < 1$.