

$$(x^2 < 1); (n > 0)$$

$$(1 \pm x)^n = \sum_{k=0}^n \frac{n!}{k!(n-k)!} (\pm x)^k$$
$$= 1 \pm nx + \frac{n(n-1)}{2!} x^2 \pm \frac{n(n-1)(n-2)}{3!} x^3 + \dots \text{ etc.}$$

$(x^2 < 1); (n > 0)$ note negative sign in formula!

$$(1 \pm x)^{-n} = \sum_{k=0}^{\infty} (-1)^k \frac{(n+k-1)!}{k!(n-1)!} (\pm x)^k$$
$$= 1 \mp nx + \frac{n(n+1)}{2!} x^2 \mp \frac{n(n+1)(n+2)}{3!} x^3 + \dots \text{ etc.}$$

Since $x^2 < 1$, the terms diminish in value rapidly and the series converges to a reasonable approximation after only a few terms.