

8C ${}^n\text{C}_r$ with Binomials

Binomial series

$$(a + b)^n = a^n + \binom{n}{1} a^{n-1}b + \binom{n}{2} a^{n-2}b^2 + \dots + \binom{n}{r} a^{n-r}b^r + \dots + b^n \quad (n \in \mathbb{N})$$

$$\text{where } \binom{n}{r} = {}^n\text{C}_r = \frac{n!}{r!(n-r)!}$$

$$(1 + x)^n = 1 + nx + \frac{n(n-1)}{1 \times 2} x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{1 \times 2 \times \dots \times r} x^r + \dots \quad (|x| < 1, n \in \mathbb{R})$$

1. Use the binomial theorem to find the expansion of $(3 - 2x)^5$

2. Find the first 4 terms in the expansion of $(1 + 2x)^{10}$

3. Find the first 4 terms in the expansion of $\left(10 - \frac{1}{2}x\right)^6$