5.4 Extending (Expanding) \((1+x)^n\) and \((a+bx)^n\)

Using Binomial Theorem, Expansion.

\[(1+x)^n = \binom{n}{0} 1^n + \binom{n}{1} 1^{n-1} x + \binom{n}{2} 1^{n-2} x^2 + \cdots\]

\[(1+x)^n = 1 + nx + \frac{n(n-1)}{2!} x^2 + \frac{n(n-1)(n-2)}{3!} x^3 + \cdots\]

Problem 10: Use Binomial Expansion to find the first four terms of \((1-2x)^6\)

Solution: Here \(n = 6, x = -2x\), using Binomial

\[(1-2x)^6 = 1 + 6(-2x) + \frac{6 \times 5}{2!} (-2x)^2 + \frac{6 \times 5 \times 4}{3!} (-2x)^3 + \cdots\]

\[(1-2x)^6 = 1 - 12x + 60x^2 - 160x^3 + \cdots\]