

5.4 Extending (Expanding) $(1+x)^n$ and $(a+bx)^n$
using Binomial Theorem, Expansion.

$$(1+x)^n = \binom{n}{0} 1^n + \binom{n}{1} 1^{n-1} x^1 + \binom{n}{2} 1^{n-2} x^2 + \dots + \binom{n}{r} 1^{n-r} x^r + \dots + \binom{n}{n} 1^0 x^n$$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!} x^2 + \frac{n(n-1)(n-2)}{3!} x^3 + \dots + \frac{n(n-1)(n-2)(n-3)}{4!} x^4 + \dots$$

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

Solution: Here $n=6$, $x=-2x$, using Binomial

$$(1-2x)^6 = 1 + 6(-2x) + \frac{6 \times 5}{2!} (-2x)^2 + \frac{6 \times 5 \times 4}{3!} (-2x)^3 + \dots$$

$$(1-2x)^6 = 1 - 12x + 60x^2 - 160x^3 + \dots \quad A$$