4A $(1+x)^n$

How do we Calculate nCr?

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

1. Find: $(1+x)^4$ **without** using the nCr button on your calculator

2. Find: $(1-2x)^3$ **without** using the nCr button on your calculator

When does this formula come unstuck?

3. Find $\frac{1}{(1+x)}$ up to the x^3 term

4. Find the Binomial expansion of: $(1-x)^{\frac{1}{3}}$ up to the x^3 term and state the values of x for which it is valid…

5. Find the Binomial expansion of: $\frac{1}{(1+4x)^2}$ up to the x^3 term and state the values of x for which it is valid…

6. Find the Binomial expansion of: $\sqrt{1-2x}$ up to the x^3 term and by using x = 0.01, find an estimate for √2

7.

$$f(x) = \frac{2 + x}{\sqrt{1 + 5x}}$$

a) Find the x^2 term in the series expansion of $f(x)$

b) State the range of values of x for which the expansion is valid

8. In the expansion of $(1 + kx)^{-4}$ the coefficient of x^2 is 90, and $k > 0$

a) Find the value of k

b) Find the corresponding coefficient of the x^3 term

4B $(a+bx)^n$

1. Find the first 4 terms in the Binomial expansion of: $\sqrt{4+x}$

2. Find the first 4 terms in the Binomial expansion of: $\frac{1}{(2+3x)^2}$

4C Partial Fractions

1. Find the expansion of: $\frac{4-5x}{(1+x)(2-x)}$ up to and including the term in x^3