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A LEVEL MATHS

(22) Binomial Expansion of the form $(a+bx)^n$

WORKING AT D/E

(1) (a) Show that $(4+x)^{\frac{1}{2}}$ can be written as $2\left(x+\frac{x}{4}\right)^{\frac{1}{2}}$

(b) Hence, using the formula book, find the first 3 terms in the expansion of $(4+x)^{\frac{1}{2}}$

(c) Write down the set of values of x for which the expansion ins valid.

(2) (a) Cyril wants to find the expansion of $(3-x)^{-2}$. He wants to use Pascal's Triangle to find the coefficients of each term. Explain why he can't

(b) Using the formula book, show that the first 3 terms in ascending powers of x in the expansion of $(3-x)^{-2}$ are $\frac{1}{9}+\frac{2}{27}x+\frac{1}{27}x^2$ ....

(c) Write down the set of values of x for which the expansion ins valid.

(3) Find the first 4 terms in ascending powers of x in the expansion of $(2+3x)^{-4}, |x|<\frac{2}{3}$

WORKING AT B/C

(1) Use the formula book to show that the first 3 terms in ascending powers of $x$in the expansion of $\frac{1+x}{\sqrt{9-x}},\ |x|<9$ are $\frac{1}{3}+\frac{19}{54}x+\frac{13}{648}x^2$ ….

(2) (a) Find the first 3 terms in the expansion of $\sqrt{2+x},\ |x|<2$ in ascending powers of x simplifying each coefficient.

(b) Use your answer to part (a) with a suitable value of x to find an approximation to value of $\frac{\sqrt{201}}{10}$

(3) Find the first 2 terms in the series expansion of $\frac{5-x}{(2+x)^2}$ stating the set of values of x for which the expansion ins valid.

WORKING AT A*/A

(1) $f(x)=(2+bx)^c$

Given that the first two terms in the binomial expansion of $f(x)$ are $\frac{1}{4}-\frac{3}{4}x$….

(a) Write down the value of c

(b) Find the value of b.

(c) Find the 3rd term in the expansion

(d) Find the set of values of x for which the expansion ins valid.

(e) Without any further expansions, find the first 3 terms in the expansion of $(2-bx)^c$

(2) (a) Find the first 4 terms in ascending powers of x in the expansion of $(x+8)^{\frac{1}{3}}$ simplifying each term.

(b) Find the set of values of x for which the expansion ins valid.

(c) Use your answer to part (b) to find a cubic approximation for $\sqrt[3]{9}$, showing all your workings.

(d) Find the percentage error in your approximation.

(e) Explain how this approximation could be improved.

(3) (a) $h(x)=\frac{1}{1+x}+\frac{1}{1-x}, |x|<1$

Explain why there are no odd powers of x in the series expansion of $h(x)$.