Algebra: The Binomial Expansion – Test 1a

Recommended Time: 40 minutes

1) Write down the first 4 terms in **ascending** powers of x in the **binomial expansion** of:

a) $(1 + x)^{-2}$ (4)

*Answer part a) **carefully** as it is can be linked to the other parts of question 1.*

b) $(2 + 2x)^{-2}$ (3)

c) $(1 - x)^{-2}$ (3)

d) $(2 + 3x)^{-2}$ (5) **15**

For each expansion clearly state the range of values for which the expansion is valid.

2) Write down the first 4 terms in **ascending** powers of x in the **binomial expansion** of $(3 + 6x)^{0.1}$. Write your answer in the form $3^{0.1}(1 + ax + bx^2 + cx^3...)$ (5) **5**

Clearly state the range of values for which the expansion is valid.

3) a) Write down the first 4 terms in **ascending** powers of x in the **binomial expansion** of $(1 - 2x)^{\frac{1}{2}}$ (4)

b) By substituting 0.02 for x in the **binomial expansion** of $(1 - 2x)^{\frac{1}{2}}$ estimate the value of $(0.96)^{\frac{1}{2}}$

*Use **all** 4 terms from part a) and your **full** calculator display in working out your estimate.* (2)

c) **Hence** estimate $\sqrt{6}$ again using *your **full** calculator display.* (2) **8**

4) Show that, if x is small enough for x^3 and higher powers of x to be neglected, then the function $(x - 1)(1 + x)^{\frac{2}{3}}$ has a quadratic approximation of the form $a + bx + cx^2$.

State the values of a, b and c. (5) **5**

5) a) Expand $\dfrac{2}{(x+1)(x+3)}$ as a series in **ascending** powers of x stating the first 3 terms. (8)

b) State the range of values for which the expansion in part a) is valid. (1)

c) Expand $\sqrt{\dfrac{x+1}{2x+1}}$ as a series in **ascending** powers of x up to the term containing x^2. (7)

d) State the range of values for which the expansion in part c) is valid. (1) **17**

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