

Topic Y7: Binomial and partial fractions (Pre-TT) [41]

1.

(i) Expand $(1 - 3x)^{-2}$ in ascending powers of x , up to and including the term in x^2 . [3]

(ii) Find the coefficient of x^2 in the expansion of $\frac{(1 + 2x)^2}{(1 - 3x)^2}$ in ascending powers of x . [4]

(Total 7 marks)

2.

(i) Given that $\frac{3x + 4}{(1 + x)(2 + x)^2} \equiv \frac{A}{1 + x} + \frac{B}{2 + x} + \frac{C}{(2 + x)^2}$, find A , B and C . [5]

(ii) Hence or otherwise expand $\frac{3x + 4}{(1 + x)(2 + x)^2}$ in ascending powers of x , up to and including the term in x^2 . [5]

(iii) State the set of values of x for which the expansion in part (ii) is valid. [1]

(Total 11 marks)

3.

(i) Expand $(1 + ax)^{-4}$ in ascending powers of x , up to and including the term in x^2 . [3]

(ii) The coefficients of x and x^2 in the expansion of $(1 + bx)(1 + ax)^{-4}$ are 1 and -2 respectively. Given that $a > 0$, find the values of a and b . [5]

(Total 8 marks)

4.

(i) Expand $(1 - x)^{\frac{1}{2}}$ in ascending powers of x as far as the term in x^2 . [3]

(ii) Hence expand $(1 - 2y + 4y^2)^{\frac{1}{2}}$ in ascending powers of y as far as the term in y^2 . [3]

(Total 6 marks)

5.

(i) Show that $\frac{x}{(1 - x)^3} \approx x + 3x^2 + 6x^3$ for small values of x . [2]

(ii) Use this result, together with a suitable value of x , to obtain a decimal estimate of the value of $\frac{100}{729}$. [2]

(iii) Show that $\frac{x}{(1 - x)^3} = -\frac{1}{x^2} \left(1 - \frac{1}{x}\right)^{-3}$. Hence find the first three terms of the binomial expansion of $\frac{x}{(1 - x)^3}$ in powers of $\frac{1}{x}$. [4]

(iv) Comment on the suitability of substituting the same value of x as used in part (ii) in the expansion in part (iii) to estimate the value of $\frac{100}{729}$. [1]

(Total 9 marks)