Binomial Theorem

1 Expand $(1 + 4x)^9$ in ascending powers of x, up to and including the term in x^3, simplifying the coefficients. [4]

2 Find the coefficient of x^2 in the expansion of each of the following:

(i) $(2x^2 + 5x - 7)(x^2 - 6x + 4)$, [2]

(ii) $(2 + 5x)^{10}$. [3]

3 (i) Expand $(2 + 3x)^4$ completely, simplifying the coefficients. [4]

(ii) Hence find the coefficient of x^2 in the expansion of

$$(1 - \tfrac{1}{2}x)^2(2 + 3x)^4.$$ [3]

4 (i) Given that the first three terms in the expansion of $(1 - 4x)^6$ are $1 + cx + dx^2$, find the values of the constants c and d. [3]

(ii) Hence find the coefficient of x^2 in the expansion of

$$(2 - 3x - x^2)(1 - 4x)^6.$$ [3]

5 (i) Expand $(2 + 3x)^6$ in ascending powers of x up to and including the term in x^2, simplifying the coefficients. [3]

(ii) Given that the coefficient of x^2 in the expansion of

$$(1 + ax)(2 + 3x)^6$$

is 2304, find the value of the constant a. [3]

6 (i) Find the first four terms in the expansion, in ascending powers of x, of

$$(1 + 3x)^8.$$ [4]

(ii) Show that, if terms involving x^4 and higher powers of x may be ignored,

$$(1 + 3x)^8 + (1 - 3x)^8 = 2 + 504x^2.$$ [3]

(iii) Hence find the value of

$$1.000\,003^8 + 0.999\,997^8.$$

correct to 12 decimal places. [2]