

## PAST EXAMINATION QUESTIONS : BINOMIAL THEOREM

1. (i) Write down the expansion by the binomial theorem of  $\left(\frac{x}{2} - y\right)^5$ , and simplify the coefficients.  
 (ii) Find the term independent of  $x$  in the expansion of  $\left(x^2 - \frac{2}{x^2}\right)^4$ . (N54/P1A/ii, 54/P1B/2)
2. (i) Write down the first four terms of the expansion by the binomial theorem of  $\left(2x - \frac{1}{2x}\right)^6$  and simplify them as far as possible.  
 (ii) Use the binomial theorem to find the value of  $(1.05)^8$  correct to two decimal places. (N58/P1A/2, N58/P1B/2)
3. Write down the first five terms of the series formed by expanding  $(1 - x)^8$  in ascending powers of  $x$ . Use your answer to find  $(0.99)^8$  correct to five decimal places. (J59/6)
4. Write down and simplify the first five terms of the expansion of  $\left(1 - \frac{x}{2}\right)^{10}$ . Use your result to find the value of £1000  $(0.95)^{10}$  correct to the nearest pound. (N59/P1A/2, N59/P1B/2)
5. Write down the first five terms of the binomial expansion of  $(x + y)^8$ , simplifying the coefficients. Find the value of  $(1.004)^8$  correct to five decimal places. (J60/P2/3)
6. (i) Use the binomial theorem to find the value of  $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$ . (ii) If the coefficients of  $x^2$  and  $x^3$  in the expansion of  $(3 + ax)^9$  are the same, find the value of  $a$ . (N60/P1A/2, N60/P1B/2)
7. Use the binomial theorem to find the value of  $(0.96)^6$  correct to five decimal places. (N60/P2/4i)
8. (i) Expand  $(2 + x)^5 - (2 - x)^5$  in ascending powers of  $x$  and simplify your result. (ii) If the first three terms of the expansion of  $(1 + ax)^n$  in ascending powers of  $x$  are  $1 + 12x + 64x^2$ , find  $n$  and  $a$ . (J61/P2/3)
9. Write down the first five terms of the series  $(1 - 2x)^{10}$ . Use your expansion to find the value, correct to seven decimal place, of  $(0.998)^{10}$ . (N61/P1/4)
10. (i) Expand  $(a - b)^5$  by the binomial theorem, simplifying the coefficients. By substituting suitable values of  $a$  and  $b$ , calculate  $(9.9)^5$  correct to the nearest whole number. (ii) Find the term independent of  $x$  in the expansion of  $\left(x + \frac{1}{x}\right)^8$  by the binomial theorem. (J62/P1/3)

1. (i)  $\frac{x^5}{32} - \frac{5x^4y}{16} + \frac{5x^3y^2}{2} - \frac{5x^2y^3}{2} + \frac{5xy^4}{2} - y^5$   
(ii) 24
2. (i)  $64x^6 - 96x^4 + 60x^2 - 20$   
(ii) 1.48
3.  $1 - 8x + 28x^2 - 56x^3 + 70x^4$ , 0.92274
4.  $1 - 5x + \frac{45x^2}{4} - 15x^3 + \frac{105x^4}{8}$ , £599
5.  $x^8 + 8x^7y + 28x^6y^2 + 56x^5y^3 + 70x^4y^4$ ,  
1.03245
6. (i) 198 (ii)  $1\frac{2}{7}$
7. 0.78276
8. (i)  $160x + 80x^3 + 2x^5$   
(ii)  $9, \frac{4}{3}$
9.  $1 - 20x + 180x^2 - 960x^3 + 3360x^4$ ,  
0.9801790
10.  $a^5 - 5a^4b + 10a^3b^2 - 10a^2b^3 + 5ab^4 - b^5$ ,  
(i) 95,099 (ii) 70