General Binomial Expansion Essential Practice

Skill: General binomial expansion of $(a + bx)^n$

Questions

Attempt these questions independently showing full and clear solutions. Check each answer as you go.

1. Find the first four terms of in the following binomial expansions, giving the values of x for which the expansion is valid.
   a. $(3 + 2x)^{-2}$
   b. $(4 - 3x)^{-\frac{1}{2}}$
   c. $(64 - 32x)^{\frac{1}{3}}$
   d. $(27 + 3x)^{-\frac{2}{3}}$

2. Find the first three terms in ascending powers in the expansion of the following expressions, stating the values of x for which the expression is valid:
   a. $(2 + x)(4 + 3x)^{-\frac{3}{2}}$
   b. $(1 + 2x + 3x^2)(8 + 4x)^{\frac{2}{3}}$
   c. $\frac{1+3x}{4-x}$
   d. $\frac{2+x}{\sqrt{9+45x}}$

3.
   a. Expand $(4 + x)^{\frac{1}{2}}$ in ascending powers of x up to and including the term in x^3, stating the values of x for which the expansion is valid.
   b. Use your answer to part (a) and the substitution $x = 0.096$, find an approximate value for $\sqrt{10}$, giving your answer to 6 decimal places.
   c. Use your calculator to determine the % error between your answer to (b) and the value of $\sqrt{10}$ as given by your calculator, to 3 s.f.

4. Find the coefficient of x^2 in the series expansion of $(2 + 3x + 4x^2)\sqrt[3]{8 + 2x}$

5. The coefficients of x and x^2 in the expansion of $(1 + bx)(2 + ax)^{-2}$ are 1 and $-\frac{9}{16}$, respectively. Find the possible values of a and b.