

Answers: Binomial Expansions

Only the first 3 terms of the expansions are given here for Q1. This is because, these questions are from a textbook, which asks for the first 3 terms only. I modified it, asking for the first 4 terms, just for practice. Later, I will upload the answers with the first 4 terms. In the answers, (a) gives the answer for the expansion and (b) gives the answer for the interval of validity.

1 (i) (a) $1 - 2x + 3x^2$

(b) $|x| < 1$

(ii) (a) $1 - 2x + 4x^2$

(b) $|x| < \frac{1}{2}$

(iii) (a) $1 - \frac{x^2}{2} - \frac{x^4}{8}$

(b) $|x| < 1$

(iv) (a) $1 + 4x + 8x^2$

(b) $|x| < \frac{1}{2}$

(v) (a) $\frac{1}{3} - \frac{x}{9} + \frac{x^2}{27}$

(b) $|x| < 3$

(vi) (a) $2 - \frac{7x}{4} - \frac{17x^2}{64}$

(b) $|x| < 4$

(vii) (a) $-\frac{2}{3} - \frac{5x}{9} - \frac{5x^2}{27}$

(b) $|x| < 3$

(viii) (a) $\frac{1}{2} - \frac{3x}{16} + \frac{27x^2}{256}$

(b) $|x| < \frac{4}{3}$

(ix) (a) $1 + 6x + 20x^2$

(b) $|x| < \frac{1}{2}$

(x) (a) $1 + 2x^2 + 2x^4$

(b) $|x| < 1$

(xi) (a) $1 + \frac{2x^2}{3} - \frac{4x^4}{9}$

(b) $|x| < \frac{1}{\sqrt{2}}$

(xii) (a) $1 - 3x + 7x^2$

(b) $|x| < \frac{1}{2}$

2 (i) $1 + 3x + 3x^2 + x^3$

(ii) $1 + 4x + 10x^2 + 20x^3$ for $|x| < 1$

(iii) $a = 25, b = 63$

3 (i) $16 - 32x + 24x^2 - 8x^3 + x^4$

(ii) $1 - 6x + 24x^2 - 80x^3$ for $|x| < \frac{1}{2}$

(iii) $a = -128, b = 600$

4 (i) $1 + x + x^2 + x^3$ for $|x| < 1$

(ii) $1 - 4x + 12x^2 - 32x^3$ for $|x| < \frac{1}{2}$

(iii) $1 - 3x + 9x^2 - 23x^3$ for $|x| < \frac{1}{2}$

5 (ii) $1 + \frac{x}{8} + \frac{3x^2}{128}$ for $|x| < 4$

(iii) $1 + \frac{9x}{8} + \frac{19x^2}{128}$

6 (i) $1 - y + y^2 - y^3 \dots$

(ii) $1 - \frac{2}{x} + \frac{4}{x^2} - \frac{8}{x^3}$

(iv) $\frac{x}{2} - \frac{x^2}{4} + \frac{x^3}{8} - \frac{x^4}{16}$

(v) $x < -2$ or $x > 2; -2 < x < 2;$

no overlap in range of validity.

7 (ii) $1 + x + \frac{3x^2}{2} + \frac{5x^3}{2}$ for $|x| < \frac{1}{2}$

(iii) 0.00516