BINOMIAL EXPANSIONS

3) a) $\left(1+\frac{x}{2}\right)^{10}$ first 4 terms

$$= 1 + \binom{10}{1}\left(\frac{x}{2}\right) + \binom{10}{2}\left(\frac{x}{2}\right)^2 + \binom{10}{3}\left(\frac{x}{2}\right)^3$$

$$= 1 + 10\left(\frac{x}{2}\right) + 45\left(\frac{x}{2}\right)^2 + 120\left(\frac{x}{2}\right)^3$$

$$= 1 + 5x + \frac{45}{4}x^2 + 15x^3 + \ldots\ldots$$

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b) $(1.005)^{10} = \left(1+\frac{0.01}{2}\right)^{10}$

$$\approx 1 + 5 \times 0.01 + \frac{45}{4} \times 0.01^2 + 15 \times 0.01^3$$

$$\approx 1.05114$$

BINOMIAL EXPANSIONS

3) a) First 4 terms of $(1+ax)^{10}$

$$= 1 + \binom{10}{1}ax + \binom{10}{2}(ax)^2 + \binom{10}{3}(ax)^3$$

$$= 1 + 10ax + 45a^2x^2 + 120a^3x^3$$

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b) Coefficient of x^3 is double coefficient of x^2

$$120a^3 = 2 \times 45a^2$$

$$120a^3 = 90a^2$$

$$120a = 90$$

$$a = \frac{90}{120}$$

$$a = \frac{3}{4}$$

BINOMIAL EXPANSIONS

1) Find first 3 terms of $(3-2x)^5$

$$= 3^5 + \binom{5}{1} 3^4(-2x) + \binom{5}{2} 3^3(-2x)^2$$

$$= 243 + 5 \times 81(-2x) + 10 \times 27 \times 4x^2$$

$$= 243 - 810x + 1080x^2$$

BINOMIAL EXPANSIONS

2) a) Find first 3 terms of $(2+kx)^7$

$$= 2^7 + \binom{7}{1}2^6(kx) + \binom{7}{2}2^5(kx)^2$$

$$= 128 + 448kx + 672k^2x^2$$

---

b) coeff of x^2 = 6 × coeff of x

$$672k^2 = 6 \times 448k$$

$$672k^2 = 2688k$$

$$672k = 2688$$

$$k = \frac{2688}{672}$$

$$k = 4$$

BINOMIAL EXPANSIONS

1) Find first 3 terms of $(3-x)^6$

$$= 3^6 + \binom{6}{1} 3^5(-x) + \binom{6}{2} 3^4(-x)^2$$

$$= 729 - 1458x + 1215x^2$$

BINOMIAL EXPANSIONS

4) a) Find first 4 terms of $(1+ax)^7$

$$= 1 + \binom{7}{1}(ax) + \binom{7}{2}(ax)^2 + \binom{7}{3}(ax)^3$$

$$= 1 + 7ax + 21a^2x^2 + 35a^3x^3$$

---

b) Given $21a^2 = 525$

$$a^2 = \frac{525}{21}$$

$$a^2 = 25$$

$$\Rightarrow a = 5 \quad \text{or} \quad a = -5$$
