Binomial Theorem Ex 18.2 Q6

Term from the beginning

$$T_N = T_{r+1} = {}^nC_r x^{n-r} y^r \qquad \text{---(i)}$$

$$N = 4,\ r = 3,\ n = 9,\ x = x,\ y = \frac{2}{x}$$

$$T_4 = T_{3+1} = {}^9C_3 x^6 \left(\frac{2}{x}\right)^3 = \frac{9 \times 7 \times 8}{3 \times 2} x^3 \times 8 = \quad 672x^3$$

4^{th} term from the end = 7^{th} term from beginning

Using (i)

$$N = 7,\ r = 6,\ n = 9,\ x = x,\ y = \frac{2}{x}$$

$$T_7 = T_{6+1} = {}^9C_6 x^3 \left(\frac{2}{x}\right)^6 = \frac{9 \times 8 \times 7}{3 \times 2} \times \frac{2^6}{x^3} = \frac{5376}{x^3}$$

Binomial Theorem Ex 18.2 Q7

$$T_N = T_{r+1} = (-1)^r\ {}^nC_2 x^{n-r} y^r$$

4^{th} term from the end = 7^{th} term from beginning

$$N = 7,\ r = 6,\ n = 9,\ x = \frac{4x}{5},\ y = \frac{5}{2x}$$

$$T_7 = T_{6+1} = (-1)^6\ {}^9C_6 \left(\frac{4x}{5}\right)^3 \left(\frac{5}{2x}\right)^6 = \frac{9 \times 8 \times 7}{3 \times 2} \times \frac{4^3 \times 5^6}{5^3 \times 2^6} \times \frac{x^3}{x^6} = \frac{9 \times 8 \times 7 \times 5^3}{6 \times x^3} = \frac{9 \times 8 \times 7 \times 125}{6 \times x^3} = \frac{10500}{x^3}$$

Binomial Theorem Ex 18.2 Q8

7th term from the end = 3^{rd} term from beginning

$$T_N = T_{r+1} = (-1)^r\ {}^nC_2 x^{n-r} y^r$$

$$N = 3,\ r = 2,\ n = 8,\ x = 2x^2,\ y = \frac{3}{2x}$$

$$T_3 = T_{2+1} = (-1)^2\ {}^8C_2 \left(2x^2\right)^6 \left(\frac{3}{2x}\right)^2 = \frac{8 \times 7}{2} \times \frac{2^6 \times 3^2 \times x^{12}}{2^2 \times x^2} = 8 \times 7 \times 9 \times 8 \times x^{10} = 4032x^{10}$$

Binomial Theorem Ex 18.2 Q9(i)

$$x^{10} \text{ in } \left(2x^2 - \frac{1}{x}\right)^{20}$$

$$T_n = T_{r+1} = (-1)^r\ {}^nC_r x^{n-r} y^r$$

$$(-1)^r\ {}^{20}C_r \left(2x^2\right)^{20-r} \left(\frac{1}{x}\right)^r$$

Coefficient of x^{10} is

$$(-1)^r\ {}^{20}C_r 2^{20-r} x^{40-2r} x^{-r} \qquad \text{—(i)}$$

$$\Rightarrow \quad x^{40-3r} = x^{10}$$

$$\Rightarrow \quad 10 - 3r = 10$$

$$3r = 30$$

$$r = 10$$

Substituting $r = 10$ in(i)

$$(-1)^{10}\ {}^{20}C_{10} 2^{10}$$

$$= \quad {}^{20}C_{10} 2^{10}$$

Binomial Theorem Ex 18.2 Q9(ii)

x^7 in $\left(x - \frac{1}{x^2}\right)^{40}$

$$T_n = T_{r+1} = (-1)^r \; {}^nC_r x^{n-r} y^r$$

$= (-1)^r \; {}^{40}C_r x^{40-r} \left(\frac{1}{x^2}\right)^r$

$= (-1)^r \; {}^{40}C_r x^{40-r-2r}$

$\Rightarrow \quad x^7 = x^{40-3r}$

$7 = 40 - 3r$

$3r = 33$

$r = 11$

$= \quad (-1)^{11} \; {}^{40}C_{11}$ is coeff of x^7

$= -{}^{40}C_{11}$

*********** END **********