



Binomial Theorem Ex 18.1 Q2(vii)

$$\begin{aligned} & (\sqrt{3}+1)^5 - (\sqrt{3}-1)^5 \\ &= 2 \left[{}^5C_1(\sqrt{3})^4 + {}^5C_3(\sqrt{3})^2 + {}^5C_5 \right] \\ &= 2[5 \times 9 + 10 \times 3 + 1] \\ &= 2[45 + 30 + 1] \\ &= 2[76] \\ &= 152 \end{aligned}$$

Binomial Theorem Ex 18.1 Q2(viii)

$$\begin{aligned} & (0.99)^5 + (1.01)^5 \\ &= (1 - .01)^5 + (1 + .01)^5 \\ &= 2 \left[{}^5C_1 + {}^5C_3(.01)^2 + {}^5C_5(.01)^5 \right] \\ &= 2 \left[5 + 10 \times \frac{1}{10^4} + \frac{1}{10^{10}} \right] \\ &= 2 \left[5 + \frac{1}{1000} + \frac{1}{10^{10}} \right] \\ &= 2.0020001 \end{aligned}$$

Binomial Theorem Ex 18.1 Q2(ix)

$$\begin{aligned} & (\sqrt{3} + \sqrt{2})^6 - (\sqrt{3} - \sqrt{2})^6 \\ &= 2 \left[{}^6C_1(\sqrt{3})^5(\sqrt{2}) + {}^6C_3(\sqrt{3})^3(\sqrt{2})^3 + {}^6C_5(\sqrt{3})(\sqrt{2})^5 \right] \\ &= 2 \left[6 \times \sqrt{6} \times 9 + 20 \times 3\sqrt{3} \times 2\sqrt{2} + 6 \times \sqrt{3} \times 4\sqrt{2} \right] \\ &= 2 \left[54\sqrt{6} + 120\sqrt{6} + 24\sqrt{6} \right] \\ &= 2 \left[198\sqrt{6} \right] \\ &= 396\sqrt{6} \end{aligned}$$

Binomial Theorem Ex 18.1 Q2(x)

$$\left\{a^2 + \sqrt{a^2 - 1}\right\}^4 + \left\{a^2 - \sqrt{a^2 - 1}\right\}^4$$

$$\text{Let } a^2 = A, \quad \sqrt{a^2 - 1} = B$$

$$\begin{aligned} & (A+B)^4 + (A-B)^4 \\ &= B^4 + {}^4C_1AB^3 + {}^4C_2A^2B^2 + {}^4C_3A^3B + A^4 + B^4 - {}^4C_1AB^3 + {}^4C_2A^2B^2 - {}^4C_3A^3B + A^4 \\ &= 2\{A^4 + {}^4C_2A^2B^2 + B^4\} \\ &= 2\{A^2 + 6A^2B^2 + B^4\} \\ &= 2\left\{a^8 + 6a^4(a^2 - 1) + (a^2 - 1)^2\right\} \\ &= 2[a^8 + 6a^6 - 6a^4 + a^4 + 1 - 2a^2] \end{aligned}$$

$$\left\{a^2 + \sqrt{a^2 - 1}\right\}^4 + \left\{a^2 - \sqrt{a^2 - 1}\right\}^4 = 2a^8 + 12a^6 - 10a^4 - 4a^4 + 2$$

***** END *****