Binomial Theorem Ex 18.1 Q2(vii)

$$\left(\sqrt{3}+1\right)^5 - \left(\sqrt{3}-1\right)^5$$

$$= 2\left[\,^5C_1\left(\sqrt{3}\right)^4 + \,^5C_3\left(\sqrt{3}\right)^2 + \,^5C_5\right]$$

$$= 2\left[5 \times 9 + 10 \times 3 + 1\right]$$

$$= 2\left[45 + 30 + 1\right]$$

$$= 2\left[76\right]$$
$$= 152$$

Binomial Theorem Ex 18.1 Q2(viii)

$$\left(0.99\right)^5 + \left(1.01\right)^5$$

$$= \left(1 - .01\right)^5 + \left(1 + .01\right)^5$$
$$= 2\left[\,^5C_1 + \,^5C_3(.01)^2 + \,^5C_5(.01)^5\right]$$

$$= 2\left[5 + 10 \times \frac{1}{10^4} + \frac{1}{10^{10}}\right]$$

$$= 2\left[5 + \frac{1}{1000} + \frac{1}{10^{10}}\right]$$

$$= 2.0020001$$

Binomial Theorem Ex 18.1 Q2(ix)

$$\left(\sqrt{3}+\sqrt{2}\right)^6 - \left(\sqrt{3}-\sqrt{2}\right)^6$$

$$= 2\left[\,^6C_1\left(\sqrt{3}\right)^5\left(\sqrt{2}\right) + \,^6C_3\left(\sqrt{3}\right)^3\left(\sqrt{2}\right)^3 + \,^6C_5\left(\sqrt{3}\right)\left(\sqrt{2}\right)^5\right]$$

$$= 2\left[6 \times \sqrt{6} \times 9 + 20 \times 3\sqrt{3} \times 2\sqrt{2} + 6 \times \sqrt{3} \times 4\sqrt{2}\right]$$

$$= 2\left[54\sqrt{6} + 120\sqrt{6} + 24\sqrt{6}\right]$$

$$= 2\left[198\sqrt{6}\right]$$
$$= 396\sqrt{6}$$

Binomial Theorem Ex 18.1 Q2(x)

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

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

$$(A + B)^4 + (A - B)^4$$

$$= B^4 + {}^4C_1 AB^3 + {}^4C_2 A^2 B^2 + {}^4C_3 A^3 B + A^4 + B^4 - {}^4C_1 AB^3 + {}^4_2 A^2 B^2 - {}^4C_3 A^3 B + A^4$$

$$= 2\left(A^4 + {}^4C_2 A^2 B^2 + B^4\right)$$

$$= 2\left(A^2 + 6A^2 B^2 + B^4\right)$$

$$= 2\left(a^8 + 6a^4\left(a^2 - 1\right) + \left(a^2 - 1\right)^2\right)$$

$$= 2\left[a^8 + 6a^6 - 6a^4 + a^4 + 1 - 2a^2\right]$$

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

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