Exercise 2I

Question 2:

(i)

$$\left(2x - \frac{2}{x}\right)^3$$

$$= (2x)^3 - \left(\frac{2}{x}\right)^3 - 3 \times 2x \times \frac{2}{x}\left(2x - \frac{2}{x}\right)$$

$$\left[\because (a-b)^3 = a^3 - b^3 - 3ab\,(a-b)\right]$$

$$= 8x^3 - \frac{8}{x^3} - 12\left(2x - \frac{2}{x}\right)$$

$$= 8x^3 - \frac{8}{x^3} - 24x + \frac{24}{x}.$$

(ii)

$$\left(3a + \frac{1}{4b}\right)^3$$

$$= (3a)^3 + \left(\frac{1}{4b}\right)^3 + 3 \times 3a \times \frac{1}{4b}\left(3a + \frac{1}{4b}\right)$$

$$\left[\because (a+b)^3 = a^3 + b^3 + 3ab\,(a+b)\right]$$

$$= 27a^3 + \frac{1}{64b^3} + \frac{9a}{4b}\left(3a + \frac{1}{4b}\right)$$

$$= 27a^3 + \frac{1}{64b^3} + \frac{27a^2}{4b} + \frac{9a}{16b^2}.$$

(iii)

$$\left(\frac{4}{5}x - 2\right)^3$$

$$= \left(\frac{4}{5}x\right)^3 - (2)^3 - 3 \times \frac{4}{5}x \times 2\left(\frac{4}{5}x - 2\right)$$

$$\left[\because (a-b)^3 = a^3 - b^3 - 3ab\,(a-b)\right]$$

$$= \frac{64}{125}x^3 - 8 - \frac{24}{5}x\left(\frac{4}{5}x - 2\right)$$

$$= \frac{64}{125}x^3 - 8 - \frac{96}{25}x^2 + \frac{48}{5}x.$$

Question 3:

(i) $(95)^3$

$= (100 - 5)^3$

$= (100)^3 - (5)^3 - 3 \times 100 \times 5\,(100 - 5)$

$= 1000000 - 125 - (1500\ 95)$

$= 857375.$

(ii) $(999)^3$

$= (1000 - 1)^3$

$= (1000)^3 - (1)^3 - 3 \times 1000 \times 1\,(1000 - 1)$

= 1000000000 - 1 - 3000 (1000 - 1)
= 1000000000 - 1 - (3000 999)
= 997002999.

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