Q1 Solve using Cardon's method

$$x^3 - 15x^2 - 33x + 847 = 0 \quad \text{— (1)}$$

solution:-

Removing the second term by diminishing the roots of the given equation

$$a_0 nh + a_1 = 0$$

$$\Rightarrow h = -\frac{a_1}{na_0} = \frac{-(-15)}{3\times 1} = 5$$

5	1	-15	-33	847
		5	-50	-415
	1	-10	-83	432
		5	-25	
	1	-5	-108	
		5		
	1	0		

Transformed equation is

$$y^3 - 108y + 432 = 0 \quad \text{— (2)}$$

Where $y = x - 5$ — (3)

Let $y = p^{1/3} + q^{1/3}$

$\Rightarrow y^3 = p + q + 3p^{1/3}q^{1/3}(p^{1/3}+q^{1/3})$

$\Rightarrow y^3 - 3p^{1/3}q^{1/3}y - (p+q) = 0$ —— (4)

comparing (2) & (4)

$p^{\frac{1}{3}}q^{1/3} = 36 \quad \Rightarrow pq = 6^6$

& $p + q = -432.$

$x^2 - (\alpha+\beta)t + \alpha\beta = 0$

$\therefore$ p & q are the roots of

$t^2 + 432t + (6)^6 = 0$

$\Rightarrow t^2 + 2(6)^3 t + (6)^6 = 0$

$\Rightarrow (t + 6^3)^2 = 0$

$\Rightarrow t = -216, -216$

$\Rightarrow p = -216, \ q = -216$

$\Rightarrow p^{1/3} = -6, -6\omega, -6\omega^2$

& $q^{1/3} = -6, -6\omega, -6\omega^2$

$q^{1/3} = -6, -6\omega, -6\omega^2$

$\because y = p^{1/3} + q^{1/3}$

$= (-6-6), (-6\omega - 6\omega^2), (-6\omega^2 - 6\omega)$

$= -12, 6, 6 \quad (\because 1+\omega+\omega^2=0)$

$\because y = x - 5$

$\Rightarrow x = y + 5$

$= -12+5, 6+5, 6+5$

$\therefore x = -7, 11, 11$

<u>Ans.</u>