R.B Maths Academy

Question-Answer series

Quadratic Equations

(50 solved problems + 10 practice problems)

Do you believe in God?

Well, I do believe in higher powers . . .

$$X^2 \qquad X^3$$

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Dear students, I hope you will find the solved problems helpful while preparing for the Quadratic Equations chapter. Please let me know if you find any error. Suggestions are always welcome.

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Q.1) Solve the following equations

i) $\dfrac{x-2}{x+2} + \dfrac{x+2}{x-2} = 4$

ii) $\dfrac{1}{x+1} - \dfrac{2}{x+2} = \dfrac{3}{x+3} - \dfrac{4}{x+4}$

iii) $2^{x+1} + 4^x = 8$

iv) $x^{2/3} - x^{1/3} - 2 = 0$

Answers

i) $\dfrac{x-2}{x+2} + \dfrac{x+2}{x-2} = 4$

$\Rightarrow \dfrac{(x-2)^2 + (x+2)^2}{(x+2)(x-2)} = 4$

$\Rightarrow (x-2)^2 + (x+2)^2 = 4(x+2)(x-2)$

$\Rightarrow x^2 + 4 - 4x + x^2 + 4 + 4x = 4(x^2 - 2x + 2x - 4)$

$\Rightarrow 2x^2 + 8 = 4x^2 - 16$

$\Rightarrow 2x^2 - 24 = 0$

$\Rightarrow x^2 - 12 = 0$

$\Rightarrow x^2 = 12$

$\Rightarrow x = \pm\sqrt{12} = \pm 2\sqrt{3}$

ii) $\dfrac{1}{x+1} - \dfrac{2}{x+2} = \dfrac{3}{x+3} - \dfrac{4}{x+4}$

$\Rightarrow \dfrac{1}{x+1} + \dfrac{4}{x+4} = \dfrac{3}{x+3} + \dfrac{2}{x+2}$

$\Rightarrow \dfrac{(x+4) + 4(x+1)}{(x+1)(x+4)} = \dfrac{3(x+2) + 2(x+3)}{(x+3)(x+2)}$

$\Rightarrow \dfrac{5x+8}{x^2+5x+4} = \dfrac{5x+12}{x^2+5x+6}$

$\Rightarrow (5x+8)(x^2+5x+6) = (5x+12)(x^2+5x+6)$

$\Rightarrow 5x^3 + 25x^2 + 30x + 8x^2 + 40x + 48 = 5x^3 + 25x^2 + 20x$
$$+ 12x^2 + 60x + 48$$

$\Rightarrow 10x = 4x^2 + 20x$

$\Rightarrow 4x^2 + 10x = 0$

$\Rightarrow 2x(2x+5) = 0$

Either $x = 0$ or, $x = -5/2$

iii) $2^{x+1} + 4^x = 8$

a, $2^x \cdot 2 + 2^{2x} = 8$

Put, $y = 2^x$

a, $y^2 + 2y - 8 = 0$ a, $y^2 + 4y - 2y - 8 = 0$

a, $y(y+4) - 2(y+4) = 0$ a, $(y+4)(y-2) = 0$

a, $y \neq -4$, $y = 2$.

Put, $y = 2$ in $y = 2^x$,

$$2 = 2^x \qquad a, \quad 2^x = 2^1$$

$$x = 1.$$

iv) $x^{2/3} - x^{1/3} - 2 = 0$

Let, $y = x^{1/3}$

Then, $y^2 - y - 2 = 0$.

$$\Rightarrow y^2 - 2y + y - 2 = 0$$

$$\Rightarrow y(y-2) + (y-2) = 0$$

$$\Rightarrow (y-2)(y+1) = 0$$

Either, $y = 2$ or -1.

If $y = 2$ Then, $x^{1/3} = 2$

$$x = 8$$

If $y = -1$ Then, $x^{1/3} = -1$

$$x = -1.$$

Q.2) Solve the following equations:

i) $(x^2 + 3x + 2)^2 - 8(x^2 + 3x) - 4 = 0$

ii) $x(x+2)(x+3)(x+5) = 72$

iii) $x(x+2)(x^2-1) = -1$

iv) $(x+1)(2x+3)(2x+5)(x+3) = 945.$