



Exercise 10A

Question 39:

$$\begin{aligned}\frac{(x+3)}{(x-2)} - \frac{(1-x)}{x} &= \frac{17}{4} \\ \Rightarrow \frac{x(x+3) - (1-x)(x-2)}{x(x-2)} &= \frac{17}{4} \\ \Rightarrow \frac{x^2 + 3x - (x-2-x^2+2x)}{x^2-2x} &= \frac{17}{4} \\ \Rightarrow \frac{x^2 + 3x - x + 2 + x^2 - 2x}{x^2-2x} &= \frac{17}{4} \\ \Rightarrow \frac{2x^2 + 2}{x^2-2x} &= \frac{17}{4} \\ \Rightarrow 8x^2 + 8 &= 17x^2 - 34x \\ \Rightarrow 9x^2 - 34x - 8 &= 0 \\ \Rightarrow 9x^2 - 36x + 2x - 8 &= 0 \\ \Rightarrow 9x(x-4) + 2(x-4) &= 0 \\ \Rightarrow (x-4)(9x+2) &= 0 \\ \Rightarrow x-4=0 \quad \text{or} \quad 9x+2=0 \\ x=4 \quad \text{or} \quad x &= \frac{-2}{9}\end{aligned}$$

Hence, 4 and $x=-2/9$ are the roots of the given equation

Question 40:

$$\begin{aligned}
& \frac{1}{(x-2)} + \frac{2}{(x-1)} = \frac{6}{x} \\
& \Rightarrow \frac{x-1+2x-4}{(x-2)(x-1)} = \frac{6}{x} \\
& \Rightarrow \frac{3x-5}{x^2-3x+2} = \frac{6}{x} \\
& \Rightarrow 3x^2-5x = 6x^2-18x+12 \\
& \Rightarrow 3x^2-6x^2-5x+18x-12=0 \\
& \Rightarrow -3x^2+13x-12=0 \\
& \Rightarrow 3x^2-13x+12=0 \\
& \Rightarrow 3x^2-9x-4x+12=0 \\
& \Rightarrow 3x(x-3)-4(x-3)=0 \\
& \Rightarrow (x-3)(3x-4)=0 \\
& \Rightarrow (x-3)=0 \text{ or } 3x-4=0 \\
& \quad x=3 \text{ or } x=\frac{4}{3}
\end{aligned}$$

Hence, 3 and $x=4/3$ are the roots of the given equation.

Question 41:

$$\begin{aligned}
& \frac{1}{x-2} + \frac{1}{x} = \frac{8}{2x+5} \Rightarrow \frac{x+x-2}{x(x-2)} = \frac{8}{2x+5} \\
& \text{or } \frac{2(x-1)}{x(x-2)} = \frac{8}{2x+5} \Rightarrow (x-1)(2x+5) = 4x(x-2) \\
& \Rightarrow 2x^2-2x+5x-5 = 4x^2-8x \\
& \Rightarrow 2x^2+3x-5 = 4x^2-8x \\
& \Rightarrow 2x^2-11x+5=0 \text{ or } 2x^2-10x-x+5=0 \\
& \Rightarrow 2x(x-5)-1(x-5)=0 \text{ or } (x-5)(2x-1)=0 \\
& \Rightarrow x=5, \frac{1}{2}
\end{aligned}$$

Hence, 5 and $x=1/2$ are the roots of the given equation.

Question 42:

Putting $\left(\frac{x}{x+1}\right) = y$, the given equation become

$$\Rightarrow y^2 - 5y + 6 = 0$$

$$\Rightarrow y^2 - 3y - 2y + 6 = 0$$

$$\Rightarrow y(y - 3) - 2(y - 3) = 0$$

$$(y - 3)(y - 2) = 0$$

$$y - 3 = 0 \text{ or } y - 2 = 0$$

$$y = 3 \text{ or } y = 2$$

Case I:

$$y = 3 \Rightarrow \frac{x}{x+1} = 3$$

$$\Rightarrow 3x + 3 = x \Rightarrow 3x - x = -3$$

$$2x = -3$$

$$x = \frac{-3}{2}$$

Case II:

$$y = 2 \Rightarrow \frac{x}{x+1} = 2$$

$$2x + 2 = x \Rightarrow 2x - x = -2$$

$$x = -2$$

Hence, $\frac{-3}{2}, -2$ are the roots of the given equation

Question 43:

$$2\left(\frac{x-1}{x+3}\right) - 7\left(\frac{x+3}{x-1}\right) = 5$$

Putting $\left(\frac{x-1}{x+3}\right) = y$, the given equation become

$$2y - 7\left(\frac{1}{y}\right) = 5$$

$$2y^2 - 7 = 5y$$

$$\Rightarrow 2y^2 - 5y - 7 = 0$$

$$\Rightarrow 2y^2 - 7y + 2y - 7 = 0$$

$$\Rightarrow y(2y - 7) + 1(2y - 7) = 0$$

$$\Rightarrow (2y - 7)(y + 1) = 0$$

$$2y - 7 = 0 \text{ or } y + 1 = 0$$

Case I:

$$y = \frac{7}{2} \Rightarrow \frac{x-1}{x+3} = \frac{7}{2}$$

$$\Rightarrow 2x - 2 = 7x + 21$$

$$5x = -23 \Rightarrow x = \frac{-23}{5}$$

Case II:

$$\frac{x-1}{x+3} = -1$$

$$\Rightarrow x - 1 = -x - 3$$

$$\Rightarrow 2x = -2$$

$$x = -1$$

Hence, -1 and $\frac{-23}{5}$ are the roots of given equation

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