

Dr Oliver Mathematics

Algebra: Part 1

1. Find the set of real values of x satisfying the equation

$$\frac{x+5}{x+4} - \frac{x+6}{x+5} = \frac{x+7}{x+6} - \frac{x+8}{x+7}$$

Solution

Well,

$$\begin{aligned} \frac{x+5}{x+4} - \frac{x+6}{x+5} &= \frac{x+7}{x+6} - \frac{x+8}{x+7} \\ \Rightarrow \frac{(x+5)^2 - (x+4)(x+6)}{(x+4)(x+5)} &= \frac{(x+7)^2 - (x+6)(x+8)}{(x+6)(x+7)} \end{aligned}$$

$$\begin{array}{r|rr} \times & x & +4 \\ \hline x & x^2 & +4x \\ +6 & +6x & +24 \end{array}$$

$$\begin{array}{r|rr} \times & x & +6 \\ \hline x & x^2 & +6x \\ +8 & +8x & +48 \end{array}$$

$$\Rightarrow \frac{(x^2 + 10x + 25) - (x^2 + 10x + 24)}{(x+4)(x+5)} = \frac{(x^2 + 14x + 49) - (x^2 + 14x + 48)}{(x+6)(x+7)}$$

$$\Rightarrow \frac{1}{(x+4)(x+5)} = \frac{1}{(x+6)(x+7)}$$

$$\Rightarrow (x+4)(x+5) = (x+6)(x+7)$$

$$\begin{array}{r|rr} \times & x & +4 \\ \hline x & x^2 & +4x \\ +5 & +5x & +20 \end{array}$$

Dr Oliver
Mathematics

$$\begin{array}{r|rr} \times & x & +6 \\ \hline x & x^2 & +6x \\ +7 & +7x & +42 \\ \hline \end{array}$$

$$\Rightarrow x^2 + 9x + 20 = x^2 + 13x + 42$$

$$\Rightarrow 4x = -22$$

$$\Rightarrow \underline{\underline{x = -5\frac{1}{2}}}.$$

Dr Oliver
Mathematics

Dr Oliver
Mathematics

Dr Oliver
Mathematics

Dr Oliver
Mathematics

Dr Oliver
Mathematics