$(x+3)^2 - 1 = 3x - (x+5)(x-1) \Leftrightarrow$

$x^2 + 2\cdot 3\cdot x + 3^2 - 1 = 3x - (x^2 - x + 5x - 5) \Leftrightarrow$

$x^2 + 6x + 9 - 1 = 3x - (x^2 + 4x - 5) \Leftrightarrow$

$x^2 + 6x + 8 = 3x - x^2 - 4x + 5 \Leftrightarrow x^2 + 6x + 8 = -x^2 - x + 5 \Leftrightarrow$

$x^2 + 6x + 8 + x^2 + x - 5 = 0 \Leftrightarrow 2x^2 + 7x + 3 = 0 \Leftrightarrow$

$2x^2 + 6x + x + 3 = 0 \Leftrightarrow 2x(x+3) + 1\cdot(x+3) = 0 \Leftrightarrow (x+3)(2x+1) = 0$

$\Leftrightarrow x + 3 = 0$ sau $2x + 1 = 0$

$x = -3$ $\quad x = -\frac{1}{2}$

$\Rightarrow S = \{-3; -\frac{1}{2}\}$

$(2x+1)^2 - 3(x+2)(x-2) = x(x+3) - (x^2 - 15) \Leftrightarrow$

$(2x)^2 + 2\cdot 2x\cdot 1 + 1^2 - 3\cdot(x^2 - 2^2) = x^2 + 3x - x^2 + 15 \Leftrightarrow$

$4x^2 + 4x + 1 - 3x^2 + 12 = 3x + 15 \Leftrightarrow x^2 + 4x + 13 = 3x + 15 \Leftrightarrow$

$x^2 + 4x + 13 - 3x - 15 = 0 \Leftrightarrow x^2 + x - 2 = 0 \Leftrightarrow$

$x^2 + 2x - x - 2 = 0 \Leftrightarrow x(x+2) - 1\cdot(x+2) = 0 \Leftrightarrow (x+2)(x-1) = 0$

$x + 2 = 0$ sau $x - 1 = 0$

$x = -2$ $\quad x = 1$

$\Rightarrow S = \{-2; 1\}$

$\frac{(x-1)^2}{3} = 2x - 5 \mid \cdot 3 \Leftrightarrow \frac{(x-1)^2}{3_1} \cdot 3^1 = (2x-5)\cdot 3 \Leftrightarrow x^2 - 2x + 1 = 6x - 15 \Leftrightarrow$

$x^2 - 2x + 1 - 6x + 15 = 0 \Leftrightarrow x^2 - 8x + 16 = 0 \Leftrightarrow x^2 - 2\cdot 4x + 4^2 = 0 \Leftrightarrow$

$(x-4)^2 = 0 \Leftrightarrow x - 4 = 0 \Leftrightarrow x = 4 \Rightarrow S = \{4\}$

$\frac{x+2}{x-1} - \frac{2-x}{x+2} = 3$ $\quad$ Punem $x - 1 \neq 0 \Rightarrow x \neq 1$

$x + 2 \neq 0 \Rightarrow x \neq -2$

$\Rightarrow x \in \mathbb{R} - \{1; -2\}$

$$\frac{x+2}{x-1}-\frac{2-x}{x+2}=\frac{3}{1} \quad (x+2)(x-1) \quad x+2 \quad x-1$$

$$\Leftrightarrow \frac{(x+2)^2}{(x-1)(x+2)}-\frac{(x-1)(2-x)}{(x-1)(x+2)}=\frac{3(x+2)(x-1)}{(x-1)(x+2)} \Leftrightarrow$$

$$\frac{x^2+4x+4}{(x-1)(x+2)}-\frac{(x-1)(2-x)}{(x-1)(x+2)}-\frac{3(x^2-x+2x-2)}{(x-1)(x+2)}=0 \Leftrightarrow$$

$$\frac{x^2+4x+4-(2x-x^2-2+x)-3\cdot(x^2+x-2)}{(x-1)(x+2)}=0 \Rightarrow$$

$$x^2+4x+4-(-x^2+3x-2)-3x^2-3x+6=0 \Leftrightarrow$$

$$x^2+4x+4+x^2-3x+2-3x^2-3x+6=0 \Leftrightarrow$$

$$-x^2-2x+12=0 \mid\cdot(-1) \Leftrightarrow x^2+2x-12=0$$

$$a=1 \quad b=2 \quad c=-12$$

$$\Delta=b^2-4ac=2^2-4\cdot1\cdot(-12)=4+48=52=4\cdot13$$

$$\sqrt{\Delta}=\sqrt{4\cdot13}=2\sqrt{13} \Rightarrow x_{1,2}=\frac{-b\pm\sqrt{\Delta}}{2a}$$

$$x_{1,2}=\frac{-2\pm2\sqrt{13}}{2\cdot1}=\frac{2\cdot(-1\pm\sqrt{13})}{2\cdot1} \Rightarrow \begin{cases} x_1=-1+\sqrt{13} \\ x_2=-1-\sqrt{13} \end{cases}$$

$$\Rightarrow S=\{-1+\sqrt{13},-1-\sqrt{13}\}$$

$$\frac{3x-4}{x-1}=\frac{2x+5}{x+2}-\frac{1}{x-1} \Leftrightarrow$$

P.C. $x-1\neq0 \Rightarrow x\neq1$; $x+2\neq0 \Rightarrow x\neq-2$ $\Rightarrow x\in\mathbb{R}\setminus\{1,-2\}$

$$\frac{3x-4}{x-1}+\frac{1}{x-1}=\frac{2x+5}{x+2} \Leftrightarrow \frac{3x-4+1}{x-1}=\frac{2x+5}{x+2} \Leftrightarrow \frac{3x-3}{x-1}=\frac{2x+5}{x+2}$$

$$\Leftrightarrow \frac{3(x-1)}{1\cdot(x-1)}=\frac{2x+5}{x+2} \Rightarrow \frac{3}{1}=\frac{2x+5}{x+2} \Rightarrow 3\cdot(x+2)=1\cdot(2x+5)$$

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$\Leftrightarrow 3x+6=2x+5 \Leftrightarrow 3x-2x=5-6 \Leftrightarrow x=-1$

$S=\{-1\}$

$x^2+mx+4=0$, $-2\in S$ $\Rightarrow m=?$ $\quad m$ = parametru real

$-2\in S \Rightarrow (-2)^2+m\cdot(-2)+4=0 \Rightarrow 4-2m+4=0 \Leftrightarrow -2m=-8$

$m=\frac{-8}{-2} \Rightarrow m=4$

Proba: $x^2+4x+4=0 \Leftrightarrow (x+2)^2=0 \Leftrightarrow x+2=0 \Leftrightarrow x=-2$

$-2\in S$

$x^2+3x+m=0$, $-1\in S$ $\Rightarrow m=?$

$-1\in S \Rightarrow$

$(-1)^2+3\cdot(-1)+m=0 \Rightarrow 1-3+m=0 \Rightarrow -2+m=0$

$m=2$

$x^2+3x+2=0 \quad (-1)^2+3\cdot(-1)+2=1-3+2=0$ (A)

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