1. $6\left[\frac{x-3}{2}-3\left(\frac{x-1}{6}-\frac{1-x}{4}\right)\right]<x-7$

$$3(x-3)-3(x-1)+\frac{9}{2}(1-x)<x-7$$

$$6x-18-6x+6+9-9x<2x-14$$

$$-11x<-11 \qquad \boldsymbol{x>1}$$

2. $6+x\sqrt{2}\leq\sqrt{6}\left(1+\sqrt{6}\right)$

$$6+x\sqrt{2}\leq\sqrt{6}+6 \qquad x\sqrt{2}\leq\sqrt{6} \qquad \boldsymbol{x\leq\sqrt{3}}$$

3. $2\,(x-k)>k\,(x-1)$

$$2x-2k>kx-k \qquad (2-k)\,x>k$$

$Se\ \ k=2:\quad 0x>2 \qquad \nexists x\in\mathbb{R}$

$Se\ \ k<2:\quad x>\frac{k}{2-k}$

$Se\ \ k>2:\quad x<\frac{k}{2-k}$

4. $\frac{kx-6}{4}\leq k-3x+\frac{9-k}{2}$

$$kx-6\leq 4k-12x+18-2k \qquad x\,(k+12)\leq 2\,(k+12)$$

$Se\ \ k=-12:\quad 0x\leq 0 \qquad \forall x\in\mathbb{R}$

$Se\ \ k>-12:\quad x\leq 2$

$Se\ \ k<-12:\quad x\geq 2$

5. $\begin{cases}\frac{x}{3}-2\,(3-x)<\frac{1+x}{9}\\ \frac{-2+2x}{9}<1-\frac{3x-1}{2}\end{cases}$

$$\begin{cases}3x-18\,(3-x)<1+x\\ -4+4x<18-27x+9\end{cases} \qquad \begin{cases}20x<55\\ 31x<31\end{cases} \qquad \begin{cases}x<\frac{11}{4}\\ x<1\end{cases}$$

$$\boldsymbol{x<1}$$

6. $\begin{cases} \frac{x-1}{7} - x \leq \frac{9-x}{3} \\ 1 - x + \frac{2}{3}x \leq 0 \end{cases}$

$\begin{cases} 3x - 3 - 21x \leq 63 - 7x \\ 3 - 3x + 2x \leq 0 \end{cases}$ $\begin{cases} -11x \leq 66 \\ -x \leq -3 \end{cases}$ $\begin{cases} x \geq -6 \\ x \geq 3 \end{cases}$

$\boldsymbol{x \geq 3}$

7. $\begin{cases} 2\,(3 + x) \leq x + 7 \\ 8 + 3x > 2 \\ 5x + 4 \geq 4x + 5 \end{cases}$

$\begin{cases} 6 + 2x \leq x + 7 \\ 3x > -6 \\ x \geq 1 \end{cases}$ $\begin{cases} x \leq 1 \\ x > -2 \\ x \geq 1 \end{cases}$

$\boldsymbol{x = 1}$

8. $\frac{x-4}{x-3} < 1$

$\frac{x - 4 - x + 3}{x - 3} < 0$ $\frac{-1}{x - 3} < 0$ $\frac{1}{x - 3} > 0$

$\boldsymbol{x > 3}$

9. $\frac{3-x}{x+3} - 1 < \frac{1-2x}{6+2x}$

$\frac{6 - 2x - 6 - 2x - 1 + 2x}{2\,(x + 3)} < 0$ $\frac{-2x - 1}{x + 3} < 0$ $\frac{2x + 1}{x + 3} > 0$

$N > 0$: $2x + 1 > 0$ $x > -\frac{1}{2}$

$D > 0$: $x > -3$

$\boldsymbol{x < -3}$ $\vee$ $\boldsymbol{x > -\frac{1}{2}}$

10. $\frac{2(1+x)}{x-3} \leq \frac{2x-9}{12-4x} - \frac{3}{2}$

$$\frac{8+8x+2x-9+6x-18}{4\,(x-3)} \leq 0 \qquad \frac{16x-19}{x-3} \leq 0$$

$N \geq 0$: $\quad 16x - 19 \geq 0 \quad x \geq \frac{19}{16}$

$D > 0$: $\quad x > 3$

$$\mathbf{\frac{19}{16} \leq x < 3}$$