

$$(f) \frac{-12}{x-4} \geq x+3$$

$$(CE: x-4 \neq 0 \Leftrightarrow x \neq 4)$$

$$\Leftrightarrow -\frac{12}{x-4} - (x+3) \geq 0$$

$$\Leftrightarrow \frac{-12 - (x-4)(x+3)}{x-4} \geq 0$$

$$\Leftrightarrow \frac{-12 - (x^2 - 4x + 3x - 12)}{x-4} \geq 0$$

$$\Leftrightarrow \frac{-12 - x^2 + x + 12}{x-4} \geq 0$$

$$\Leftrightarrow \frac{-x^2 + x}{x-4} \geq 0$$

$$\Leftrightarrow \frac{x(-x+1)}{x-4} \geq 0$$

Zeits \underline{N} : $x=0$; $x=1$

\underline{D} : $x=4$

	x		0	1	4	
N	x	-	0	+	+	+
	$-x+1$	+	+	0	-	-
D	$x-4$	-	-	-	0	+
I_n		+	0	-	0	+

x ———— \bullet ———— \bullet ———— x

$$S: -\infty, 0] \cup [1, 4[$$

$$(g) x + \frac{1}{x} > 2$$

$$\Leftrightarrow x + \frac{1}{x} - 2 > 0 \Leftrightarrow \frac{x^2 + 1 - 2x}{x} > 0$$

$$\Leftrightarrow \frac{(x-1)^2}{x} > 0$$

$$\text{zeros: } N: x = 1$$

$$D: x = 0$$

x		0		1	
$(x-1)^2$		+		+	+
x		-	0	+	+
I_m		-	+	+	+
			x		x

$$S:]0, 1[\cup]1, +\infty$$

$$\text{ou } S: \mathbb{R}_0^+ \setminus \{1\}$$

$$(h) \frac{2x-3}{x-1} \leq x-1$$

$$\Leftrightarrow \frac{2x-3}{x-1} - x - 1 \leq 0$$

$$\Leftrightarrow \frac{2x-3 - (x-1)^2}{x-1} \leq 0$$

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

$$\Leftrightarrow \frac{-x^2 + 4x - 4}{x-1} \leq 0$$

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

$$\Leftrightarrow \frac{-(x-2)^2}{x-1} \leq 0$$

Zeig: N: $x=2$

D: $x=1$

x		1		2		
$-(x-2)^2$		-		0	-	
$x-1$		-	0	+	+	
I_n		+	+	-	0	-

x x

S: $]1, +\infty$

$$(i) 1 + \frac{1}{x+2} \leq \frac{x}{x-2}$$

$$\Leftrightarrow 1 + \frac{1}{x+2} - \frac{x}{x-2} \leq 0$$

$$\Leftrightarrow \frac{(x+2)(x-2) + (x-2) - x(x+2)}{(x-2)(x+2)} \leq 0$$

$$\Leftrightarrow \frac{\cancel{x^2} - 4 + x - 2 - \cancel{x^2} - 2x}{D} \leq 0$$

$$\Leftrightarrow \frac{-x - 6}{(x-2)(x+2)} \leq 0$$

zeros: N : $x = -6$

D : $x = -2, x = 2$

x		-6		-2		2	
$-x-6$	+	0	-	-	-	-	-
$x-2$	-	-	-	-	0	+	+
$x+2$	-	-	0	+	+	+	+
Im	+	0	-	+	+	-	-

$$S: [-6, -2[\cup]2, +\infty$$

$$(j) \frac{2}{(3x+2)(7x-1)} > \frac{1}{3x+2} + \frac{3}{7x-1}$$

$$\Leftrightarrow \frac{2}{(3x+2)(7x-1)} - \frac{1}{3x+2} - \frac{3}{7x-1} > 0$$

$$\Leftrightarrow \frac{2 - (7x-1) - 3(3x+2)}{(3x+2)(7x-1)} > 0$$

$$\Leftrightarrow \frac{-16x - 3}{(3x+2)(7x-1)} > 0$$

zeros : N : $x = -\frac{3}{16}$

D : $x = -\frac{2}{3}, x = \frac{1}{7}$

x		$-\frac{2}{3}$	$-\frac{3}{16}$	$\frac{1}{7}$	
$-16x-3$	+	-	+	0	-
$3x+2$	-	0	+	+	+
$7x-1$	-	-	-	0	+
I_n	+	-	-	0	+
		-		-	

x ————— x
x ————— x

S : $-\infty, -\frac{2}{3} [\cup] -\frac{3}{16}, \frac{1}{7} [$

$$(k) \frac{3}{x-2} + \frac{2}{2x^2+x-10} \geq \frac{1}{2x+5}$$

$$\hookrightarrow \text{Nenner: } 2x^2+x-10 = (x-2)(2x+5)$$

$$\Leftrightarrow \frac{3}{x-2} + \frac{2}{(x-2)(2x+5)} \ominus \frac{1}{2x+5} \geq 0$$

$$\Leftrightarrow \frac{3(2x+5) + 2 - (x-2)}{(x-2)(2x+5)} \geq 0$$

$$\Leftrightarrow \frac{5x+19}{(x-2)(2x+5)} \geq 0$$

Zeiler: N: $x = -\frac{19}{5}$

D: $x = 2, x = -\frac{5}{2}$

x		$-\frac{19}{5}$	$-\frac{5}{2}$	2	
$5x+19$	-	0	+	+	+
$x-2$	-	-	-	0	+
$2x+5$	-	-	0	+	+
I_n	-	0	+	-	+

$$S: \left[-\frac{19}{5}, -\frac{5}{2}\right] \cup [2, +\infty)$$

$$(1) \frac{x-1}{x} + \frac{x}{x-2} < \frac{4}{x^2-2x}$$

$$\Leftrightarrow \frac{x-1}{x} + \frac{x}{x-2} - \frac{4}{x(x-2)} < 0$$

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

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

$$\Leftrightarrow \frac{2x^2 - 3x - 2}{x(x-2)} < 0$$

zeros N : $x = 2, x = -\frac{1}{2}$ (Horna)
 $(x-2)(2x+1)$
 D : $x = 0, x = 2$

x		$-\frac{1}{2}$	0	2	
$x-2$	-	-	-	-	+
$2x+1$	-	0	+	+	+
x	-	-	0	+	+
$x-2$	-	-	-	-	+
I_n	+	0	-	+	+

$$S:]-\frac{1}{2}, 0[$$

$$(m) \frac{x+1}{2x+4} + \frac{1}{x+1} < \frac{1}{x^2+3x+2}$$

↳ Horner $(x+2)(x+1)$

$$\Leftrightarrow \frac{x+1}{2(x+2)} + \frac{1}{x+1} - \frac{1}{(x+2)(x+1)} < 0$$

$$\Leftrightarrow \frac{(x+1)(x+1) + 2(x+2) - 2}{2(x+2)(x+1)} < 0$$

$$\Leftrightarrow \frac{x^2 + 4x + 1 + 2x + 4 - 2}{D} < 0$$

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

Zeilen: N: $x = -3, x = -1$ (Horner)
 $(x+3)/(x+1)$

D: $x = -2, x = -1$

x		-3	-2	-1	
$x+3$	-	0	+	+	+
$x+1$	-	-	-	0	+
$x+2$	-	-	0	+	+
$x+1$	-	-	-	0	+
I_n	+	0	-	+	?

x ————— x

S:]-3, -2[

$$(n) \frac{2}{3x-1} - \frac{-1}{2x-1} > \frac{1}{(3x-1)(2x-1)}$$

$$\Leftrightarrow \frac{2}{3x-1} + \frac{1}{2x-1} - \frac{1}{(3x-1)(2x-1)} > 0$$

$$\Leftrightarrow \frac{2(2x-1) + (3x-1) - 1}{(3x-1)(2x-1)} > 0$$

$$\Leftrightarrow \frac{7x-4}{(3x-1)(2x-1)} > 0$$

zeros : N : $x = \frac{4}{7}$

D) : $x = \frac{1}{2}, x = \frac{1}{3}$

x	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{4}{7}$	
$7x-4$	-	-	- 0 +	
$3x-1$	- 0 +	+ +	+ +	
$2x-1$	- - 0 +	- 0 +	+ +	
I_n	- +	+ -	- 0 +	
	x-----x		x-----x	

S : $] \frac{1}{3}, \frac{1}{2} [\cup] \frac{4}{7}, +\infty$

$$(o) \frac{-1}{x+3} - \frac{2}{x-1} \geq \frac{1}{x^2+2x-3}$$

↳ Momen: $(x+3)(x-1)$

$$\Leftrightarrow \frac{-1}{x+3} - \frac{2}{x-1} - \frac{1}{(x+3)(x-1)} \geq 0$$

$$\Leftrightarrow \frac{-(x-1) - 2(x+3) - 1}{(x+3)(x-1)} \geq 0$$

$$\Leftrightarrow \frac{-3x-6}{(x+3)(x-1)} \geq 0$$

zeros N $x = -2$

D $x = 1, x = -3$

x		-3		-2		1	
$-3x-6$		+		+	0	-	-
$x+3$		-	0	+		+	+
$x-1$		-		-		-	0
I_n		+	+	-	0	+	+
		x	x		o	x	

$$S: -\infty, -3[\cup [-2, 1[$$