(4) a) $\mathbb{D} = \mathbb{R} \setminus \{4\}$

$\frac{x-2}{2x-8} \geq 1 \quad | \cdot (2x-8)$

1. Fall:

$2x - 8 > 0 \quad | +8$

$2x > 8 \quad | :2$

$x > 4$

$x - 2 \geq 2x - 8 \quad | +8; -x$

$6 \geq x$

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2. Fall: $2x - 8 < 0 \quad | +8$

$2x < 8 \quad | :2$

$x < 4$

$x - 2 \leq 2x - 8 \quad | +8; -x$

$6 \leq x$

$\mathbb{L} = \{x \in \mathbb{R}: 4 < x \leq 6\}$

c) $\mathbb{D} = \mathbb{R} \setminus \{-6; -3\}$

$\frac{x+2}{x+3} > \frac{2x+3}{x+6} \quad | \cdot (x+6)$

Fall 1: $x > -6$

$\frac{(x+2)\cdot(x+6)}{(x+3)} > 2x+3$

$\frac{x^2+8x+12}{(x+3)} > 2x+3 \quad | \cdot (x+3)$

Fall 1.1 $x > -3$

$x^2 + 8x + 12 > (2x+3)(x+3)$

$x^2 + 8x + 12 > 2x^2 + 9x + 9 \quad | -(2x^2+8+12)$

$0 > x^2 + x - 3$

pq-Formel: $-\frac{1}{2} \pm \sqrt{\frac{13}{4}}$

$x_1 = -2{,}303 \quad x_2 = 1{,}303$

Fall 1.2 $x < -3$

(unerfüllbar)

Fall 2. $x < -6$

$\frac{(x+2)\cdot(x+6)}{(x+3)} < 2x+3$

$\frac{x^2+8x+12}{(x+3)} < 2x+3 \quad | \cdot (x+3) \qquad x+12$

Fall 1.1 $x > -3$

(unerfüllbar)

Fall 1.2 $x < -3$

$x^2 + 8x + 12 > (2x+3)(x+3)$

$x^2 + 8x + 12 > 2x^2 + 9x + 9 \quad | -(x^2+8x+12)$

$0 > x^2 + x - 3$

pq-Formel: $-\frac{1}{2} \pm \sqrt{\frac{13}{4}}$

$x_1 = -2{,}303 \quad x_2 = 1{,}303$

$\mathbb{L} = \{x \in \mathbb{R}: -3 < x < -2{,}303 \vee x > 1{,}303\}$

5) $\log_{\frac{1}{3}}(x^2 - 3x + 2) \geq \quad | \cdot (\frac{1}{3})$

$\Leftrightarrow x^2 - 3x + 2 \geq 1 \quad | -1$

$\Leftrightarrow x^2 - 3x + 1 \geq 0$

pq-Formel:

$x_{1;2} = \frac{3}{2} \pm \sqrt{(\frac{3}{2})^2 - 1}$

$\Rightarrow x_1 = 0{,}382 \quad x_2 = 2{,}618$

$\mathbb{L} = \{x \in \mathbb{R}: 0{,}382 \leq x \leq 2{,}618\}$

(2)

a) $\sin(2x) = \sin(x)$

$\sin(2x) = \sin(x + 2\pi k) \quad |\sin^{-1}$

$2x = x + 2\pi k \quad |-x$

$x = 2\pi k$

b) $2x \cdot e^x = e^x \quad |:e^x ; 2$

$x = \frac{1}{2}$

c) $5x^2 - 8 = x^2 - x \quad |-x^2 + x$

$4x^2 + x - 8 = 0$

$\frac{-1 \pm \sqrt{129}}{8} = x$

$\Rightarrow x_1 = 1.29 \quad x_2 = -1.54$

d)

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

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

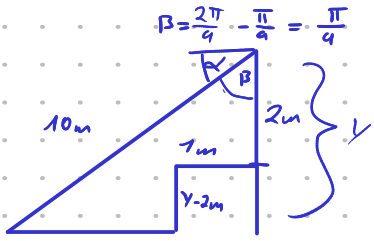
$= \log(x^2+1) = \log(x^2 - 6x + 9) \quad |10^{()}$

$\Leftrightarrow x^2 + 1 = x^2 - 6x + 9 \quad |-(x^2+1)$

$\Leftrightarrow 6x + 8 = 0 \quad |-8 ; 6$

$\Leftrightarrow x = -\frac{4}{3}$

(3)



$y = \cos(\beta) \cdot L$

$x = y - h$

$\Rightarrow x = \cos\left(\frac{\pi}{4}\right) \cdot 10m - 2m = 5.07m$