

Ungleich Aufgabe 49

Bestimmen Sie die Lösungsmenge der Ungleichung für $x \in \mathbb{R}$:

$$18x^2 - 119x - 356 \geq 1672 - 6x^2$$

$$18x^2 - 119x - 356 \geq 1672 - 6x^2 \quad | +6x^2 - 1672$$

$$24x^2 - 119x - 2028 \geq 0 \quad | :24$$

$$x^2 - \frac{119}{24}x - 84,5 \geq 0$$

$$x^2 - \frac{119}{24}x + \left(\frac{119}{48}\right)^2 - \left(\frac{119}{48}\right)^2 - 84,5 \geq 0$$

$$x^2 - \frac{119}{24}x + \frac{14161}{2304} - \frac{14161}{2304} - \frac{194688}{2304} \geq 0$$

$$\left(x - \frac{119}{48}\right)^2 - \frac{208849}{2304} \geq 0 \quad | + \frac{208849}{2304}$$

$$\left(x - \frac{119}{48}\right)^2 \geq \frac{208849}{2304} \quad | \sqrt{\quad}$$

$$\left|x - \frac{119}{48}\right| \geq \frac{457}{48}$$

Fallunterscheidung:

1. Fall

$$\left|x - \frac{119}{48}\right| = x - \frac{119}{48} \quad \text{für } x - \frac{119}{48} \geq 0 \quad \rightarrow x \geq \frac{119}{48}$$

$$x - \frac{119}{48} \geq \frac{457}{48} \quad | + \frac{119}{48}$$

$$x \geq \frac{576}{48} = 12$$

$$L_1 = x \geq \frac{119}{48} \cap x \geq 12 = x \geq 12$$

2. Fall

$$\left| x - \frac{119}{48} \right| = -\left(x - \frac{119}{48} \right) \text{ für } x - \frac{119}{48} < 0 \rightarrow x < \frac{119}{48}$$

$$-\left(x - \frac{119}{48} \right) \geq \frac{457}{48} \quad | + \frac{119}{48}$$

$$-x + \frac{119}{48} \geq \frac{457}{48} \quad | + x - \frac{457}{48}$$

$$x \leq \frac{338}{48} = \frac{169}{24}$$

$$L_2 = x < \frac{119}{48} \cap x \leq \frac{169}{24} = x \leq \frac{169}{24}$$

$$L = L_1 \cup L_2 = x \geq 12 \cup x \leq \frac{169}{24} = x \geq 12 \vee x \leq \frac{169}{24}$$

