

1. Mathematikstegreifaufgabe

Klasse 11

- Lösungen -

1. a) $f: x \mapsto y = f(x) = \frac{2x^2 + 3x - 1}{x^2 - 2}$ Der Nenner wird 0 für: $x^2 = 2$
 $x = \pm\sqrt{2}$

$ID_f = \mathbb{R} \setminus \{-\sqrt{2}; +\sqrt{2}\}$

b) $0 = \frac{2x^2 + 3x - 1}{x^2 - 2}$
 $0 = 2x^2 + 3x - 1$

$$x_{01/02} = \frac{-3 \pm \sqrt{9+8}}{4} = \frac{-3 \pm \sqrt{17}}{4} = \begin{cases} x_{01} = \frac{1}{4}(-3 + \sqrt{17}) \approx 0,28 \\ x_{02} = \frac{1}{4}(-3 - \sqrt{17}) \approx -1,78 \end{cases}$$

c) $\frac{2x^2 + 3x - 1}{x^2 - 2} = 7 \quad / \cdot (x^2 - 2)$
 $\Rightarrow 2x^2 + 3x - 1 = 7x^2 - 14$
 $\Rightarrow -5x^2 + 3x + 13 = 0$
 $x_{1/2} = \frac{-3 \pm \sqrt{9+260}}{-10}$
 $x_1 = \frac{3 + \sqrt{269}}{10} \approx 1,94$
 $x_2 = \frac{3 - \sqrt{269}}{10} \approx -1,34$

2. $\cos(x) = 0$ für $x \in \left\{ \dots -\frac{5}{2}\pi, -\frac{3}{2}\pi, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3}{2}\pi, \frac{5}{2}\pi, \dots \right\}$

$$x_{01} = -\frac{3}{2}\pi \quad x_{02} = -\frac{\pi}{2} \quad x_{03} = \frac{\pi}{2} \quad x_{04} = \frac{3}{2}\pi$$

3. $f: x \mapsto y = \begin{cases} -2x - 1; & x \in [-4; -1]; \\ x^2; & x \in [-1; 2]; \\ 4x - 4; & x \in [2; 3]; \end{cases}$

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