

Vergelijkingen oplossen met behulp van substitutie

ANTWOORDEN

$$1. \begin{cases} (x+3) = (x+3)^2 \\ p = p^2 \Rightarrow p(p-1) = 0 \Rightarrow p = 0 \vee p = 1 \\ x = -3 \vee x = -2 \end{cases}$$

$$2. \begin{cases} \sqrt{\sin x + 1} = \sin x + 1 \\ p = p^2 \Rightarrow p^2 - p = 0 \Rightarrow p(p-1) = 0 \Rightarrow p = 0 \vee p = 1 \\ \sin x = -1 \vee \sin x = 0 \Rightarrow x = 0 \pmod{\pi} \vee x = 1 \frac{1}{2} \pi \pmod{2\pi} \end{cases}$$

$$3. \begin{cases} (x^2 - x)^3 = 4 \cdot (x^2 - x)^2 \\ p^3 = 4 \cdot p^2 \Rightarrow p^3 - 4 \cdot p^2 = p^2(p-4) = 0 \Rightarrow p = 0 \vee p = 4 \\ x^2 - x = 0 \Rightarrow x(x-1) = 0 \Rightarrow x = 0 \vee x = 1 \\ x^2 - x = 4 \Rightarrow x^2 - x - 4 = 0 \Rightarrow x = \frac{1}{2} \mp \frac{1}{2} \sqrt{17} \end{cases}$$

$$4. \begin{cases} \left(\frac{3 \sin x - 1}{4} \right)^2 = \frac{1}{4} \\ p^2 = \frac{1}{4} \Rightarrow p = \frac{1}{2} \vee p = -\frac{1}{2} \\ \frac{3 \sin x - 1}{4} = \frac{1}{2} \Rightarrow 3 \sin x - 1 = 2 \Rightarrow \sin x = 1 \Rightarrow x = \frac{1}{2} \pi \pmod{2\pi} \\ \frac{3 \sin x - 1}{4} = -\frac{1}{2} \Rightarrow 3 \sin x - 1 = -2 \Rightarrow \sin x = -\frac{1}{3} \Rightarrow \text{enz.} \end{cases}$$

$$5. \begin{cases} (x+2 - \sqrt{x+2})^2 = 36 \\ (p^2 - p)^2 = 36 \Rightarrow p^2 - p = 6 \vee p^2 - p = -6 \Rightarrow (p-3)(p+2) = 0 \Rightarrow p = 3 \vee p = -2 \\ \sqrt{x+2} = 3 \Rightarrow x = 7 \\ \sqrt{x+2} = -2 \Rightarrow \text{k.n.} \end{cases}$$

$$6. \begin{cases} \frac{1}{{}^3\log x} + 2 = {}^3\log x \\ \frac{1}{p} + 2 = p \Rightarrow 1 + 2p = p^2 \Rightarrow p^2 - 2p - 1 = 0 \Rightarrow p = 1 \mp \sqrt{2} \\ {}^3\log x = 1 \mp \sqrt{2} \Rightarrow x = 3^{1 \mp \sqrt{2}} \end{cases}$$

$$7. \begin{cases} \left(\frac{2a-1}{a+1}\right)^2 = \frac{2a-1}{a+1} + 2 \\ p^2 = p + 2 \Rightarrow p^2 - p - 2 = 0 \Rightarrow (p-2)(p+1) = 0 \Rightarrow p = 2 \vee p = -1 \\ \frac{2a-1}{a+1} = 2 \Rightarrow 2a-1 = 2a+2 \Rightarrow k.n. \\ \frac{2a-1}{a+1} = -1 \Rightarrow 2a-1 = -a-1 \Rightarrow 3a = 0 \Rightarrow a = 0 \end{cases}$$

$$8. \begin{cases} e^{2x} - 2e^x = 3 \\ p^2 - 2p = 3 \Rightarrow (p-3)(p+1) = 0 \Rightarrow p = 3 \vee p = -1 \\ e^x = 3 \vee e^x = -1 \Rightarrow x = \ln 3 \end{cases}$$

$$9. \begin{cases} \left(\frac{x+1}{x-2}\right)^2 = 3 \cdot \frac{x+1}{x-2} \\ p^2 = 3p \Rightarrow p(p-3) = 0 \Rightarrow p = 0 \vee p = 3 \\ \frac{x+1}{x-2} = 0 \Rightarrow x = -1 \quad \frac{x+1}{x-2} = 3 \Rightarrow x+1 = 3x-6 \Rightarrow 2x = 7 \Rightarrow x = 3\frac{1}{2} \end{cases}$$

$$10. \begin{cases} \frac{1}{{}^2\log(x-2)} = {}^2\log(x-2) \\ \frac{1}{p} = p \Rightarrow p^2 = 1 \Rightarrow p = \mp 1 \\ {}^2\log(x-2) = 1 \Rightarrow x-2 = 2 \Rightarrow x = 4 \\ {}^2\log(x-2) = -1 \Rightarrow x-2 = \frac{1}{2} \Rightarrow x = 2\frac{1}{2} \end{cases}$$