ABI AUFGABEN PFLICHTTEILE GLEICHUNGEN

2014 $x^4 = 4 + 3x^2$ Substituiere: $u := x^2$

$u^2 = 4 + 3u$ umstellen

$u^2 - 3u - 4 = 0$

$(u-4)(u+1) = 0$ $u_1 = 4; u_2 = -1$

Rücksubstitution: $x^2 = 4 \Rightarrow \mathbb{L} = \{-2; 2\}$

2013 $2e^x - \frac{4}{e^x} = 0$ Substituiere: $u := e^x$

$2u - \frac{4}{u} = 0 \quad | \cdot u \neq 0$

$2u^2 - 4 = 0 \quad u^2 = 2 \Rightarrow u = \sqrt{2}$

Rücksubstitution: $e^x = \sqrt{2} \Rightarrow x = \ln \sqrt{2} = \ln 2^{\frac{1}{2}}$ $\mathbb{L} = \{\frac{1}{2} \cdot \ln 2\}$

2012 $\sin x \cdot \cos x - 2 \cos x = 0$

$\cos x (\sin x - 2) = 0$

$x_1 = \frac{\pi}{2} + k \cdot \pi$ $\sin x = 2 \Rightarrow$ keine Lös.

$\mathbb{L} = \{\frac{\pi}{2}; \frac{3}{2}\pi\}$

2011 $4e^{2x} + 6e^x = 4$ Substituiere: $u := e^x$

$4u^2 + 6u = 4 \quad | :2$, stelle um

$2u^2 + 3u - 2 = 0$ abc-Formel

$x_{1,2} = \frac{-3 \pm \sqrt{9+16}}{4}$ $x_1 = \frac{1}{2}$; $x_2 = -2$ (keine weitere Lös.)

Rücksubstitution: $e^x = \frac{1}{2} \Rightarrow x = \ln \frac{1}{2}$

$\mathbb{L} = \{\ln \frac{1}{2}\}$

2009 $(2x^2 - 8) \cdot (e^{2x} - 6) = 0$

Nullprodukt, d.h. entw. $2x^2 - 8 = 0$

$x^2 = 4 \Rightarrow x = \pm 2$

oder $e^{2x} - 6 = 0$

$2x = \ln 6 \Rightarrow x = \frac{1}{2} \ln 6$

$\mathbb{L} = \{-2; \frac{1}{2} \ln 6; 2\}$

2008 $\frac{6}{x^4} + \frac{1}{x^2} = 1 \quad | \cdot x^4 \quad [x \neq 0]$

$6 + x^2 = x^4$ Substituiere: $u := x^2$

$u^2 - u - 6 = 0$

$(u+2)(u-3) = 0$ $u_1 = -2$ (keine weitere Lös.) $u_2 = 3$

Rücksubstitution: $x^2 = 3$ $\mathbb{L} = \{-\sqrt{3}; \sqrt{3}\}$

2007 $e^x - 2 - \frac{15}{e^x} = 0$ Substituiere $u := e^x$

$u - 2 - \frac{15}{u} = 0 \quad | \cdot u$

$u^2 - 2u - 15 = 0$

$(u-5)(u+3) = 0$ $u_1 = 5$; $u_2 = -3$ (keine weitere Lös.)

Rücksubstitution: $e^x = 5 \Rightarrow \mathbb{L} = \{\ln 5\}$

2005 $x^3 - 3x^3 - 4x = 0$ X ausklammern

$x(x^4 - 3x^2 - 4) = 0 \rightarrow x_1 = 0$ [Nullprodukt]

Substituiere: $u := x^2$ $u^2 - 3u - 4 = 0$

$(u-4)(u+1) = 0$ $u_1 = 4$; $u_2 = -1$ (keine w. L.)

Rücksubstituiere ... $\mathbb{L} = \{-2; 2\}$

2004 $e^{4x} - 11e^{2x} + 18 = 0$ Substituiere: $u := e^{2x}$

$u^2 - 11u + 18 = 0$

$(u-9)(u-2) = 0$ $u_1 = 9$ $u_2 = 2$

Rücksubstitution: $e^{2x} = 9 \Rightarrow 2x_1 = \ln 9$

$x_1 = \frac{1}{2} \ln 9 = \ln(9^{\frac{1}{2}}) = \ln 3$

$2x_2 = \ln 2 \Rightarrow x_2 = \frac{1}{2} \ln 2$

$\mathbb{L} = \{\frac{1}{2} \ln 2; \ln 3\}$