

## Ausführliche Lösungen zu den Übungsaufgaben im MINISKRIPT

### Lösungen - Logarithmen

1. a)

$$\begin{aligned}
 & 3^x = 9 && | \log_3( ) \\
 \Leftrightarrow & \log_3(3^x) = \log_3(9) \\
 \Leftrightarrow & \underline{\underline{x = 2}}
 \end{aligned}$$

b)

$$\begin{aligned}
 & e^x = 7 && | \ln( ) \\
 \Leftrightarrow & \ln(e^x) = \ln(7) \\
 \Leftrightarrow & x = \ln(7) \\
 \Leftrightarrow & \underline{\underline{x \approx 1,946}}
 \end{aligned}$$

c)

$$\begin{aligned}
 & 3^{x-1} = 2 && | \log_3( ) \\
 \Leftrightarrow & \log_3(3^{x-1}) = \log_3(2) \\
 \Leftrightarrow & x - 1 = \log_3(2) && | + 1 \\
 \Leftrightarrow & x = \log_3(2) + 1 \\
 \Leftrightarrow & \underline{\underline{x \approx 1,631}}
 \end{aligned}$$

d)

$$\begin{aligned}
 & e^x - 2 = 5 && | + 2 \\
 \Leftrightarrow & e^x = 7 && | \ln( ) \\
 \Leftrightarrow & \ln(e^x) = \ln(7) \\
 \Leftrightarrow & x = \ln(7) \\
 \Leftrightarrow & \underline{\underline{x \approx 1,946}}
 \end{aligned}$$

e)

$$\begin{aligned}
 & 5 + e^{2x} = 7 && | - 5 \\
 \Leftrightarrow & e^{2x} = 2 && | \ln( ) \\
 \Leftrightarrow & \ln(e^{2x}) = \ln(2) \\
 \Leftrightarrow & 2x = \ln(2) && | : 2 \\
 \Leftrightarrow & x = \frac{1}{2} \ln(2) \\
 \Leftrightarrow & \underline{\underline{x \approx 0,347}}
 \end{aligned}$$

2. a)

$$\begin{array}{lcl}
 e^{3x-5} = e^{7x+1} & & \ln( ) \\
 \Leftrightarrow & 3x - 5 = 7x + 1 & | - 7x \\
 \Leftrightarrow & -4x - 5 = 1 & | + 5 \\
 \Leftrightarrow & -4x = 6 & | : (-4) \\
 \Leftrightarrow & \underline{\underline{x = -\frac{3}{2}}} & 
 \end{array}$$

b)

$$\begin{array}{lcl}
 & e^4 = e^{x^2+3x} & | \ln( ) \\
 \Leftrightarrow & 4 = x^2 + 3x & | - 4 \\
 \Leftrightarrow & 0 = x^2 + 3x - 4 & \\
 \Rightarrow & x_{1,2} = \frac{-3 \pm \sqrt{3^2 - 4 \cdot 1 \cdot (-4)}}{2 \cdot 1} & \\
 \Leftrightarrow & x_{1,2} = \frac{-3 \pm \sqrt{25}}{2} & \\
 \Rightarrow & \underline{\underline{x_1 = -4}} \text{ oder } \underline{\underline{x_2 = 1}} & 
 \end{array}$$