

Nr. 8) a) $e^{2x} - 6 \cdot e^x + 8 = 0$ | Sub: $u = e^x$

$$u^2 - 6 \cdot u + 8 = 0 \Rightarrow u_{1,2} = +3 \pm \sqrt{9-8} = +3 \pm 1$$

$$u_1 = 4 \text{ Rück. Sub} \quad \vee \quad u_2 = 2$$

$$e^x = 4 \quad | \ln$$

$$e^x = 2 \quad | \ln$$

$$\underline{\underline{x_1 = \ln(4)}}$$

$$\underline{\underline{x_2 = \ln(2)}}$$

b) $e^{2x} + 12 \cdot e^x = 45$ | Sub: $u = e^x$

$$u^2 + 12u - 45 = 0 \Rightarrow u_{1,2} = -6 \pm \sqrt{36+45} = -6 \pm 9$$

$$u_1 = +3 \quad | \text{Rück. Sub} \quad \vee \quad u_2 = -15$$

$$e^x = 3 \quad | \ln$$

$$e^x = -15 \quad \nrightarrow \text{keine Lösung}$$

$$\underline{\underline{x = \ln(3) \approx 1,099}}$$

c) $e^{2x} - e^x - 6 = 0$ | Sub: $u = e^x$

$$u^2 - u - 6 = 0 \Rightarrow u_{1,2} = +\frac{1}{2} \pm \sqrt{\frac{1}{4}+6} = \frac{1}{2} \pm \frac{5}{2}$$

$$u_1 = \frac{6}{2} = 3 \quad | \text{Rück. Sub.} \quad \vee \quad u_2 = -\frac{4}{2} = -2$$

$$e^x = 3 \quad | \ln$$

$$e^x = -2 \quad \nrightarrow \text{keine Lösung}$$

$$\underline{\underline{x = \ln(3) \approx 1,099}}$$

d) $e^x - 2 - \frac{15}{e^x} = 0$ | Sub: $u = e^x$

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

$$u^2 - 2u - 15 = 0 \Rightarrow u_{1,2} = 1 \pm \sqrt{1+15} = 1 \pm 4$$

$$u_1 = 5 \quad | \text{Rück. Sub.} \quad \vee \quad u_2 = -3$$

$$e^x = 5 \quad | \ln$$

$$e^x = -3 \quad \nrightarrow \text{keine Lösung}$$

$$\underline{\underline{x = \ln(5) \approx 1,609}}$$

Nr. 8) e) $2 \cdot e^x + 15 = 8 \cdot e^{-x}$

$$2 \cdot e^x + 15 - 8 \cdot e^{-x} = 0 \quad | \text{Sub: } u = e^x$$

$$2 \cdot u + 15 - \frac{8}{u} = 0 \quad | \cdot u$$

$$2 \cdot u^2 + 15u - 8 = 0 \Rightarrow u_{1,2} = \frac{-15 \pm \sqrt{15^2 - 4 \cdot 2 \cdot (-8)}}{2 \cdot 2}$$

$$u_1 = \frac{-15 + 17}{4} = \frac{1}{2}$$

$$u_2 = \frac{-15 - 17}{4} = -8$$

Rück.Sub. $e^x = \frac{1}{2} \quad | \ln$

$e^x = -8 \quad \nrightarrow$ keine Lösung

$$\underline{\underline{x = \ln\left(\frac{1}{2}\right) = \ln(1) - \ln(2) = 0 - \ln(2) \approx -0,693}}$$

f) $e^{2x} + 20 = 9e^x \quad | \text{Sub: } u = e^x$

$$u^2 + 20 = 9u \quad | -9u$$

$$u^2 - 9u + 20 = 0 \Rightarrow u_{1,2} = \frac{9 \pm \sqrt{81 - 20}}{2} = \frac{9 \pm 8}{2}$$

$$u_1 = \frac{10}{2} = 5 \quad | \text{Rück.Sub.}$$

$$u_2 = \frac{1}{2} = 0,5 \quad | \text{Rück.Sub.}$$

$$e^x = 5 \quad | \ln$$

$$e^x = 0,5 \quad | \ln$$

$$\underline{\underline{x_1 = \ln(5) \approx 1,609}}$$

$$\underline{\underline{x_2 = \ln(0,5) \approx -0,693}}$$