

$$b) \sqrt{-x} = 3 \Rightarrow x = -9$$

$$c) \sqrt{x} = -3 \text{ keine Lsg.}$$

$$d) \sqrt{7x+2} - 3 = 5 \Leftrightarrow \sqrt{7x+2} = 8$$

$$\Rightarrow 7x+2 = 64$$

$$\Leftrightarrow x = \frac{62}{7}$$

$$e) \sqrt{x+1} - \sqrt{x-1} = 0 \Leftrightarrow \sqrt{x^2-1} = 0$$

$$\Rightarrow x^2 = 1$$

$$\Leftrightarrow x = 1 \vee x = -1$$

fällt weg, da nicht im Def.-Bereich

$$f) 2x = \sqrt{1-8x} - 5 \Leftrightarrow 2x+5 = \sqrt{1-8x} \Rightarrow (2x+5)^2 = 1-8x$$

$$\Leftrightarrow 4x^2 + 28x + 24 = 0$$

$$\Leftrightarrow x^2 + 7x + 6 = 0$$

$$\text{pq-F.: } x_{1,2} = -\frac{7}{2} \pm \sqrt{\left(\frac{7}{2}\right)^2 - 6}$$
$$= -\frac{7}{2} \pm \frac{5}{2}$$

$$x_1 = -6, x_2 = -1$$

$$g) \sqrt{x+13} = 1 + \sqrt{x} \Rightarrow x+13 = 1 + 2\sqrt{x} + x$$

$$\Leftrightarrow 12 = 2\sqrt{x}$$

$$\Leftrightarrow 6 = \sqrt{x}$$

$$\Rightarrow x = 36$$

$$h) 2\sqrt{x+1} - \sqrt{2x+3} = 1 \Leftrightarrow 2\sqrt{x+1} = \sqrt{2x+3} + 1$$

$$\Rightarrow 4(x+1) = 2x+3 + 2\sqrt{2x+3} + 1$$

$$\Leftrightarrow 2x = 2\sqrt{2x+3}$$

$$\Leftrightarrow x = \sqrt{2x+3}$$

$$\Rightarrow x^2 = 2x + 3$$

$$\Leftrightarrow x^2 - 2x - 3 = 0$$

$$\text{pq-F: } x_{1,2} = 1 \pm \sqrt{1+3}$$
$$= 1 \pm 2$$

~~$x_1 = -1, x_2 = 3$~~
Probe!

A23

$$\text{a) } 2^{4x-8} = 1 \Leftrightarrow \ln(2^{4x-8}) = \ln(1) \Leftrightarrow (4x-8) \ln(2) = 0$$

$$\Leftrightarrow x = 2$$

$$\text{b) } 8^{x-2} = \sqrt{8} \Leftrightarrow (x-2) \ln 8 = \ln \sqrt{8} \Leftrightarrow x = \frac{\ln \sqrt{8}}{\ln 8} + 2$$

$$\text{c) } 9^{5x+1} = 2 \Leftrightarrow (5x+1) \ln 9 = \ln 2 \Leftrightarrow 5x+1 = \frac{\ln 2}{\ln 9}$$

$$\Leftrightarrow x = \frac{1}{5} \left(\frac{\ln 2}{\ln 9} - 1 \right)$$

$$\text{d) } e^{2+x} = 10 \Leftrightarrow 2+x = \ln(10) \Leftrightarrow x = \ln 10 - 2$$

$$\text{e) } 2^x = 3^x \Leftrightarrow \left(\frac{2}{3}\right)^x = 1 \Leftrightarrow x \ln\left(\frac{2}{3}\right) = 0$$

$$\Leftrightarrow x = 0$$

$$\text{f) } 2^{x+1} - 3^x = 0 \Leftrightarrow 2^x \cdot 2^1 = 3^x \Leftrightarrow 2 = \left(\frac{3}{2}\right)^x$$

$$\Leftrightarrow \ln(2) = x \ln\left(\frac{3}{2}\right)$$

$$\Leftrightarrow x = \frac{\ln(2)}{\ln\left(\frac{3}{2}\right)}$$

$$\text{g) } 5^x = 2 \cdot 3^x \Leftrightarrow \left(\frac{5}{3}\right)^x = 2 \Leftrightarrow x \ln\left(\frac{5}{3}\right) = \ln(2)$$

$$\Leftrightarrow x = \frac{\ln(2)}{\ln\left(\frac{5}{3}\right)}$$

A24

$$\text{a) } \ln(x+1) = 5 \Leftrightarrow x+1 = e^5 \Leftrightarrow x = e^5 - 1$$

$$b) \ln(x^2) + \ln(\sqrt{x}) = 10 \Leftrightarrow \ln(x^{5/2}) = 10$$

$$\Leftrightarrow x^{5/2} = e^{10}$$

$$\Leftrightarrow x = e^{10 \cdot 2/5}$$

$$\Leftrightarrow x = e^4$$

$$c) \ln(x-1) + \ln(x+2) = 1 \Leftrightarrow \ln[(x-1)(x+2)] = 1$$

$$\Leftrightarrow (x-1)(x+2) = e^1$$

$$\Leftrightarrow x^2 + x - 2 - e = 0$$

$$\text{pq-F: } x_{1/2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 2 + e}$$

$$x_1 = -\frac{1}{2} + \sqrt{\frac{9}{4} + e}, \quad x_2 = -\frac{1}{2} - \sqrt{\frac{9}{4} + e}$$

keine Lsg. da nicht im Def.-Ber.

$$d) \ln x = \ln 4 - \ln 3 \Leftrightarrow \ln x = \ln\left(\frac{4}{3}\right) \Leftrightarrow x = \frac{4}{3}$$

$$e) \ln x^2 = \frac{1}{2} \ln(81) - \frac{1}{3} \ln(125) \Leftrightarrow \ln x^2 = \ln 9 - \ln 5$$

$$\Leftrightarrow \ln x^2 = \ln\left(\frac{9}{5}\right)$$

$$\Leftrightarrow x^2 = \frac{9}{5}$$

$$\Leftrightarrow x = \pm \sqrt{\frac{9}{5}}$$

$$f) \ln x - \ln \sqrt{x} = 2 \ln 4 \Leftrightarrow \ln \sqrt{x} = \ln 16$$

$$\Leftrightarrow \sqrt{x} = 16$$

$$\Rightarrow x = 256$$

A25

$$a) \begin{array}{cc|cc} 2 & 3 & 16 & \cdot 3 \\ 3 & -2 & -2 & \cdot 2 \end{array} \quad \begin{array}{cc|c} 6 & 9 & 48 \\ 6 & -4 & -4 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \ominus \quad \begin{array}{ccc} 6 & 9 & 48 \\ 0 & -13 & -52 \end{array}$$