HA: S. 70 ②

c.) $e^{2x} = 7 \quad |\ln()$

$\ln(e^{2x}) = \ln(7)$ [$\ln e = 1$!]

log.-Gesetz (3) anwenden

$2x \cdot \ln(e) = \ln(7) \quad |:2$

$x = \frac{1}{2}\ln(7)$

$x \approx 0{,}973$

1.) $4e^{-2x-3} = 6 \quad |:4$

$e^{-2x-3} = \frac{3}{2} \quad |\ln()$

da $\ln e^k = k$ schreiben wir direkt:

$-2x-3 = \ln\left(\frac{3}{2}\right) \quad |+3$

$-2x = \ln\left(\frac{3}{2}\right)+3 \quad |:(-2)$

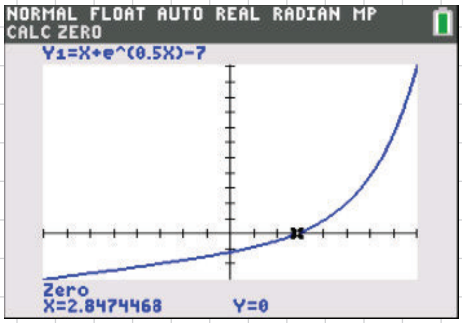
$x = -\frac{1}{2}\left(\ln\left(\frac{3}{2}\right)+3\right) \approx 1{,}70$

S. 70 ④

b.) $x + e^{0{,}5x} = 7$

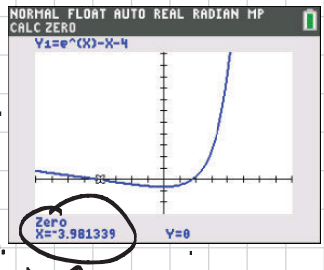
$\backslash y_1 = x + e^{0{,}5x} - 7$ [GRAPH] für $-8 \le x \le 8$

2nd CALC zero $\rightsquigarrow$ $x \approx 2{,}847$

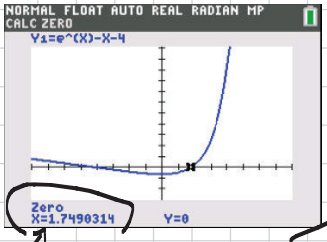


c.) $e^x - x = 4$

2nd CALC zero 2mal durchführen, für Nullstelle links der y-Achse und diejenige rechts der y-Achse.



x_1



x_2

$x_1 \approx -3{,}98 \qquad x_2 \approx 1{,}75$

Alternativ:

$\backslash y_1 = e^x - x$

$\backslash y_2 = 4$

2nd CALC intersection ...

S. 70 ⑧

b.) $e^x - 2 - \frac{15}{e^x} = 0 \quad | \cdot e^x$

$e^{2x} - 2e^x - 15 = 0$

Substituiere: $u := e^x \Rightarrow u^2 = e^{2x}$

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

$u_{1,2} = 1 \pm \sqrt{1 + 15}$

$u_1 = 5 \quad [u_2 = -3]$ $\ln(-3)$ nicht def.!

Rücksubstitution: $e^x = 5$

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

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

$2e^{2x} + 15e^x = 8\underbrace{e^{-x} \cdot e^x}_{= e^0 = 1}$

Subst.: $u := e^x$

$2u^2 + 15u - 8 = 0$

$u_{1,2} = \frac{-15 \pm \sqrt{225 + 64}}{4}$

$u_1 = \frac{1}{2} \quad [\underbrace{u_2 = -16}]$ $\ln(-16)$ n. def.

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

S. 71 ⑪ b.) $2{,}5^x = 7 \quad | \ln(\,)$

$\ln(2{,}5^x) = \ln(7) \quad |$ Log. gesetz (3)

$x \cdot \ln(2{,}5) = \ln(7) \quad | : \ln(2{,}5)$

$x = \frac{\ln(7)}{\ln(2{,}5)} \approx 2{,}12$

c.) $3 \cdot 5^{x-2} = 7{,}2 \quad | : 3$

$5^{x-2} = 7{,}2 \quad | \ln(\,)$

$\ln(5^{x-2}) = \ln(7{,}2) \quad |$ Log. gesetz (3)

$(x-2)\ln(5) = \ln(7{,}2) \quad | : \ln(5)$

$x - 2 = \frac{\ln(7{,}2)}{\ln(5)} \quad | + 2$

$x = \frac{\ln(7{,}2)}{\ln(5)} + 2$

$x \approx 2{,}544$