

S155

$$1) \quad 5 \cdot \log(2x) + 4 \cdot \log \sqrt{0,5x} - 0,5 \cdot \log(16x^4) - 2 \cdot \log(0,25)$$

$$\log(2x)^5 + \log((1/2x)^{1/2})^4 - \log(16x^4)^{1/2} - \log(1/4)^2$$

$$\log \frac{32x^5 \cdot 1/4 \cdot x^2}{4 \cdot x^2 \cdot 1/16} = \log \frac{8x^5 \cdot 16}{4} = \log(2x)^5 \\ = 5 \cdot \log(2x)$$

$$2) \quad 2 \cdot \ln(3a^2) - 6 \cdot \ln(\sqrt[3]{2a^7}) + 1/3 \cdot \ln(27(a^6)^6) - 4 \ln(2/a)$$

$$\ln(3a^2)^2 - \ln((2a^7)^{1/3})^6 + \ln(27a^{12})^{1/3} - \ln(2/a)^4$$

$$\ln \frac{9a^4 \cdot 3a^4}{4a^8 \cdot 1/16a^4} = \ln \left( \frac{27}{16} \cdot a^4 \right) = \ln(3/4)^3 \cdot a^4 \\ = 3 \cdot \ln 3/4 + 4 \cdot \ln a$$

$$3) \quad A(0) = 2.000,- \quad p = 2\% = 0,02 \quad \Rightarrow \quad q = 1 + 0,02 = 1,02$$

$$c) \quad x \hat{=} \text{Jahre:} \quad A(x) = 2.000 \cdot 1,02^{3x} \rightarrow \text{alle 4 Monate } \cdot 3 = 1 \text{ Jahr} \quad \text{wacht \uparrow \text{€ um}}$$

$$A(10) = 2.000 \cdot 1,02^{30} = 3.622,72$$

$$x \hat{=} \text{Monate} \quad A(x) = 2.000,- \cdot 1,02^{1/4 x} \rightarrow \text{Zinsen nach 4 Monaten}$$

$$A(120) = 2.000,- \cdot 1,02^{1/4 \cdot 120} = 3.622,72$$

$$b) \quad q_{\text{Jahre}} = 1,02^3 = 1,0612 \quad \Rightarrow \quad p = 0,0612 = 6,12\%$$

$$c) \quad K(x) = 2.691,74 = 2.000,- \cdot 1,02^{3x} \quad | \cdot 2.000$$

$$1,346 = 1,02^{3x} \quad | \text{LOG}$$

$$\log 1,346 = \log 1,02^{3x} = 3x \cdot \log 1,02 \quad | : (3 \cdot \log 1,02)$$

$$\frac{\log 1,346}{3 \cdot \log 1,02} = 5 \text{ Jahre}$$

$$4) \quad A(4) = 34.209,2625 \text{ L} \quad p = 5\% = 0,05 \Rightarrow q = 1 - 0,05 = 0,95$$

24% K

$$a) \quad A(4) = 34.209,2625 = A(0) \cdot 0,95^4 \quad | : 0,95^4$$

$$A(0) = 42.000 \text{ L} = 42 \text{ m}^3$$

$$1 \text{ L} = 1 \text{ dm}^3$$

$$b) \quad x \hat{=} \text{Tage} : \quad A(x) = 42.000 \cdot 0,95^{\frac{1}{12}x} \rightarrow \text{nach } 7 \text{ Tagen } :-5\%$$

$$A(365) = 42.000 \cdot 0,95^{365/12}$$

$$A(365) = 2895,31 \text{ L} = 2.895,310 \text{ cm}^3$$

$$c) \quad A(x) < 21.000$$

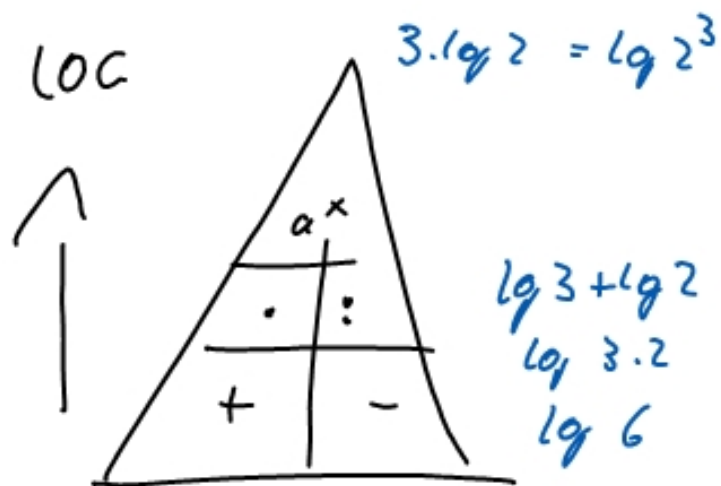
$$A(x) = 21.000 = 42.000 \cdot 0,95^{-\frac{1}{12}x} \quad | : 42000 \quad x = 95 \text{ Tage}$$

$$0,5 = 0,95^{-\frac{1}{12}x}$$

| log

↑

$$\log 0,5 = \log 0,95^{-\frac{1}{12}x} = -\frac{1}{12}x \cdot \log 0,95 \quad \dots \Rightarrow x = 94,59$$



$$a^x = b \quad | \log$$

$$\log a^x = \log b$$

$$x \cdot \log a = \log b \quad | : \log a$$

$$x = \frac{\log b}{\log a}$$

$$x = \log_a b$$

$$3 \log x^2 - 4 \cdot \log \sqrt{2} + \frac{1}{3} \log x^6 = 0,5 \cdot \log 16$$

$$\log (x^2)^3 - \log (2^{1/2})^4 + \log (x^6)^{1/3} = \log 16^{1/2}$$

$$\log \frac{x^6 x^2}{4} = \log 4 \quad | \cdot 10^x$$

$$x^8 = 4 \quad | \cdot 4$$

$$x^8 = 16 \quad \rightarrow \quad x = \sqrt[8]{16}$$

$$q > 1$$

exp. Wachstum | Zerfall

$$A(x) = A(0) \cdot q^x$$

$$|q| < 1$$

Algen  $10 \text{ m}^2$   
je Monat  $+3\%$

Wachstum  $> 1$   $\leftarrow q^{\downarrow} = 1 + 0,03 = 1,03$

$$A(x) = 10 \text{ m}^2 \cdot 1,03^x$$

$x$  Monat

$x \hat{=} \text{Jahre}$

$$A(x) = 10 \text{ m}^2 \cdot 1,03^{12 \cdot x}$$



Halbwertszeit  $q = 0,5$

1 kg Jod  $\rightarrow$  500 Jahre

$$A(x) = 1 \text{ kg} \cdot 0,5^{\frac{1}{500}x}$$

$x \hat{=} \text{Jahre}$



$$\begin{aligned}
 64 \cdot 2 \cdot \text{Ld } 0,1 &= (2^6) \cdot \text{Ld } 0,1^2 = 2^6 \cdot \text{Ld } 0,1^2 \\
 &= 2^{\text{Ld } 0,1^{12}} = 0,1^{12} = 10^{-12}
 \end{aligned}$$

$$12 \cdot \text{Ln } \sqrt[4]{e^3} = 12 \cdot \text{Ln } e^{-3/4} = 12 \cdot (-3/4) = -9$$

$$4) \left(\frac{1}{\sqrt{e}}\right)^{\text{Ln } 19} + 100 \log_4 16^2 - 16 \ln \text{Ld } 4 + 2 \cdot \log_4 0,001 - 3 \text{Ln } \frac{1}{e^2} + \frac{1}{4} \text{Ld } \frac{1}{25} \cdot 6$$

$$e^{-\text{Ln } \text{Ln } 19} + 10^2 \cdot \log_4 4 - 2^{4 \cdot \text{Ln } \text{Ld } 4} + 2 \cdot \log_4 10^{-3} - 3 \text{Ln } e^{-2} + \text{Ld} (2^{-8})^{1/4}$$

$$3 + 16 - 16 - 6 + 9 - 2$$

4

$$[e^{\heartsuit}]' \rightarrow e^{\heartsuit} \cdot \heartsuit' \quad \text{Kettenregel}$$

$$e^{3x^2-1} \rightarrow e^{3x^2-1} \cdot (3x^2-1)' = e^{3x^2-1} \cdot 6x$$

$$(e^x)' \rightarrow e^x \cdot (x)' = e^x \cdot 1 = e^x$$

$$(2^x)' = [(e^{\ln 2})^x]' = (e^{\ln 2 \cdot x})'$$

$$\Rightarrow e^{\ln 2 \cdot x} (\ln 2 \cdot x)' = 2^x \cdot \ln 2$$

$$(a^x)' = a^x \cdot \ln a$$