

ZHDS, 12.6.2019

L

1.

$$13 \cdot 5^x - 2 = 999 \quad | +2$$

$$13 \cdot 5^x = 1001 \quad | : 13$$

$$5^x = 77 \quad | \log$$

$$x \cdot \log 5 = \log 77$$

$$x = \frac{\log 77}{\log 5} = 2.698196\dots$$

$$\approx \underline{\underline{2.699}}$$

2.

$$125 \cdot 3^{x-1} = 27 \cdot 5^{x-1} \quad | : 125 : 5^{x-1}$$

$$\frac{3^{x-1}}{5^{x-1}} = \frac{27}{125}$$

$$\left(\frac{3}{5}\right)^{x-1} = \frac{27}{125} \quad | \log$$

$$(x-1) \cdot \log\left(\frac{3}{5}\right) = \log\left(\frac{27}{125}\right)$$

$$x-1 = \frac{\log\left(\frac{27}{125}\right)}{\log\left(\frac{3}{5}\right)}$$

$$x = \frac{\log\left(\frac{27}{125}\right)}{\log\left(\frac{3}{5}\right)} + 1$$

$$\underline{\underline{x = 4}}$$

$$\left(\frac{3}{5}\right)^x \left(\frac{3}{5}\right)^{-1} = \left(\frac{3}{5}\right)^3 \quad | \cdot \frac{5}{3}$$

$$\left(\frac{3}{5}\right)^x = \left(\frac{3}{5}\right)^4$$

$$\underline{\underline{x = 4}}$$

L

$$3. \quad 5 \log(20x+60) - 3 = 12 \quad | +3$$
$$= 15 \quad | :5$$

$$\log(20x+60) = 3$$

$$\Leftrightarrow 20x+60 = 10^3$$

$$20x+60 = 1000 \quad | -60$$

$$20x = 940$$

$$\underline{\underline{x = 47}}$$

$$4. \quad 2 \cdot \log_2(3x+5) - 3 = 7 \quad | +3$$

$$2 \log_2(\quad) = 10 \quad | :2$$

$$\log_2(3x+5) = 5$$

$$\Leftrightarrow 3x+5 = 2^5 = 32$$

$$3x+5 = 32$$

$$3x = 27$$

$$\underline{\underline{x = 9}}$$

$$5. \quad 3000 = 1000 \cdot (1 + 0.028)^n \quad / : 1000$$

$$3 = 1.028^n \quad / \log$$

$$n \cdot \log(1.028) = \log 3$$

$$n = \frac{\log 3}{\log 1.028} = 39.782'931 \dots$$

$$\approx 39.8$$

Zwischen dem 39. und dem 40. Jahr

$$6. \quad 580'000 = 1'250'000 \cdot q^{10} \quad / : 10^4$$

$$58 = 125 \cdot q^{10}$$

$$125 \cdot q^{10} = 58 \quad / : 125$$

$$q^{10} = \frac{58}{125}$$

$$q = \sqrt[10]{\frac{58}{125}}$$

(nur pos. Lösung interessiert hier)

$$p = q - 1$$

$$= \sqrt[10]{\frac{58}{125}} - 1 \approx \underline{\underline{-7.39\%}}$$

(-7.391'277'...)

$$q = 0.9261$$

$$q = 1 + p$$

$$p = q - 1 =$$

$$7. \quad 5'000'000 \cdot (1 - 18.5\%)^n = 22'000 \cdot (1 + 27.7\%)^n \quad | : 1000$$

$$5000 \cdot 0.815^n = 22 \cdot 1.277^n \quad | : 5000 : 1.277^n$$

$$\frac{0.815^n}{1.277^n} = \frac{22}{5000} = \frac{44}{10'000} = 0.0044$$

$$\left( \frac{0.815}{1.277} \right)^n = 0.0044 \quad | \log$$

$$n \cdot \log \left( \frac{0.815}{1.277} \right) = \log(0.0044)$$

$$n = \frac{\log(0.0044)}{\log \left( \frac{0.815}{1.277} \right)} = 12.0828 \dots$$

Zwischen dem 12. und dem 13. Jahr.