

1. a)  $\lg x = -3$   $x = 10^{-3} = \frac{1}{1000}$   
 b)  $\log_2 x = 5$   $x = 2^5 = \underline{32}$   
 c)  $\log_{\frac{1}{64}} x = \frac{1}{3}$   $x = \left(\frac{1}{64}\right)^{\frac{1}{3}} = \sqrt[3]{\frac{1}{64}} = \frac{1}{4}$   
 d)  $\log_3 x = -2$   $x = 3^{-2} = \frac{1}{9}$   
 e)  $\log_{64} x = -\frac{1}{3}$   $x = 64^{-\frac{1}{3}} = \frac{1}{64^{\frac{1}{3}}} = \frac{1}{\sqrt[3]{64}} = \frac{1}{4}$   
 f)  $\log_{\frac{1}{2}} x = 7$   $x = \left(\frac{1}{2}\right)^7 = \frac{1}{128}$   
 g)  $\log_{\frac{1}{2}} x = \frac{1}{2}$   $x = \left(\frac{1}{2}\right)^{\frac{1}{2}} = \sqrt{\frac{1}{2}}$   
 h)  $\log_{\frac{1}{3}} 27 = x$   $\rightarrow \left(\frac{1}{3}\right)^x = 27$   $\underline{x = -3}$ , da  $\left(\frac{1}{3}\right)^{-3} = 3^3 = 27$   
 i)  $\log_x 81 = -4$   $\rightarrow x^{-4} = 81$   $\underline{x = \frac{1}{3}}$ , da  $\left(\frac{1}{3}\right)^{-4} = 3^4 = 81$   
 j)  $x = \log_c \frac{1}{c} + \log_{\frac{1}{c}} c$   $x = -1 - 1 = \underline{-2}$
2. a)  $\lg(x-3) = 3$   $\rightarrow 10^3 = x-3$   $\rightarrow \underline{x = 1003}$   
 b)  $\log_5(1-2x) = 4$   $\rightarrow 5^4 = 1-2x$   $\rightarrow \underline{x = -312}$   
 c)  $\lg(x^2 - 21) = 2$   $\rightarrow 10^2 = x^2 - 21$   $\rightarrow \underline{x_{1,2} = \pm 11}$   
 d)  $\lg(x^2 - 4x) = 2$   $\rightarrow 10^2 = x^2 - 4x$   $\rightarrow \underline{x_1 \approx 12,198}$   $\underline{x_2 \approx -8,198}$   
 e)  $\lg 3 + \lg x = \lg(1000 - 5x)$   $\rightarrow \lg(3x) = \lg(1000 - 5x)$   $\rightarrow 3x = 1000 - 5x$   $\underline{x = 125}$   
 f)  $\lg x = \lg a - \lg b$   $\rightarrow \lg x = \lg \frac{a}{b}$   $\rightarrow \underline{x = \frac{a}{b}}$   
 g)  $\lg x = 3\lg a + 2\lg b - 4\lg c$   $\rightarrow \lg x = \lg \frac{a^3 b^2}{c^4}$   $\rightarrow \underline{x = \frac{a^3 b^2}{c^4}}$   
 h)  $\lg x = \frac{1}{3}\lg a + \frac{1}{2}\lg b - \lg c$   $\rightarrow \lg x = \lg \frac{\sqrt[3]{a} \sqrt{b}}{c}$   $\rightarrow \underline{x = \frac{\sqrt[3]{a} \sqrt{b}}{c}}$   
 i)  $\lg(x-1) + \lg 3 = \lg(x^2 - 1)$   $\rightarrow \lg(3(x-1)) = \lg(x^2 - 1)$   $\rightarrow 3x - 3 = x^2 - 1$   $\rightarrow \underline{x = 2}$  [ $x = 1$ ] entfällt  
 j)  $\lg x - \lg 4 = \lg 35 - \lg(x+4)$   $\rightarrow \lg \frac{x}{4} = \lg \frac{35}{x+4}$   $\rightarrow \frac{x}{4} = \frac{35}{x+4}$   $\rightarrow \underline{x_1 = 10}$   $\underline{x_2 = -14}$   
 k)  $\frac{1}{\lg x + 1} - \frac{3}{\lg x - 3} = 2$   $\rightarrow \lg x - 3 - 3\lg x - 3 = 2(\lg x + 1)(\lg x - 3)$   $\rightarrow -2\lg x = 2(\lg x)^2 - 4\lg x$   
 $\rightarrow 2(\lg x)^2 - 2\lg x = 0$   $\rightarrow \lg x \cdot (\lg x - 1) = 0$   $\rightarrow \lg x = 0$  oder  $\lg x - 1 = 0$   $\rightarrow \underline{x_1 = 1}$   $\underline{x_2 = 10}$   
 l)  $\lg(x+1)^2 = \lg 2 + \lg(x+1) + \lg(x-1)$   $\rightarrow \lg(x+1)^2 = \lg(2(x+1)(x-1))$   $\rightarrow (x+1)^2 = 2(x^2 - 1)$   
 $\rightarrow x^2 - 2x - 3 = 0$   $\rightarrow \underline{x_1 = 3}$  [ $x_2 = -1$ ] entfällt  
 m)  $\lg(x-2) - \frac{1}{2}\lg 4 = \frac{1}{3}\lg 125 - \lg(x+1)$   $\rightarrow \lg \frac{x-2}{2} = \lg \frac{5}{x+1}$   $\rightarrow (x-2) \cdot (x+1) = 10$   $\rightarrow x^2 - x - 12 = 0$   
 $\rightarrow \underline{x_1 = 4}$  [ $x_2 = -3$ ] entfällt
3. a)  $\log_3 205 \approx \underline{4,845}$   
 b)  $\log_{2,5} 10 \approx \underline{2,513}$   
 c)  $\log_6 345 \approx \underline{3,261}$   
 d)  $\log_6 0,345 \approx \underline{-0,594}$   
 e)  $\log_{0,5} 2,3 \approx \underline{-1,202}$   
 f)  $\log_{0,5} 0,003 \approx \underline{8,381}$