1. $a(x) = 3^x$ $b(x) = (\frac{1}{2})^x$ $c(x) = 3^{x+2} - 1$ $d(x) = (\frac{1}{2})^{x-3} + 1$ $e(x) = 2{\cdot}3^{2+x} - 2$ $f(x) = 2{\cdot}(\frac{1}{2})^{x+2} - 1$ $g(x) = 3^{2-x} - 3$ $h(x) = (\frac{1}{3})^{3-x} - 1$ $i(x) = 2^{2x+2} - 2$ $j(x) = 2^{2x+3} - 2$ $k(x) = -(\frac{1}{2})^{3-x} - 2$ $l(x) = (\frac{1}{2})^{\frac{9-x^2}{3-x}} - 2$ $m(x) = 3^{\frac{9-6x+x^2}{3-x}} - 3$ $n(x) = (\frac{1}{2})^{\frac{x^2-9}{3-x}} - 2$

2. a)$3^x = 27$ b)$2^x = 8$ c)$3^{3x} = 27$ d)$2^{3x} = 8$ e)$3^{5x-3} = 81$ f)$2^{5x-3} = 16$ g)$3^{4x-5} = 729$ h)$2^{4x-5} = 64$ i)$3^{|x|} = 27$ j)$(\frac{1}{3})^{3x-2} = 81$ k)$3^{|3x-4|} = 9^{2x-2}$ l)$2^{-4x} = \frac{1}{4}$ m)$4^x = \frac{1}{4}$ n) $10^x = 0,01$ o)$10^x = 0,01{\cdot}10^{3x+3}$ p)$4^x = 32$ q)$(\frac{3}{2})^{-2x} = \frac{27}{8}$ r)$(\frac{1}{0,125})^{2x} = 128$ sz)$(0,125)^{3-4x} = \frac{1}{32}$ t)$2^{-4x} = \frac{1}{4^{5x-1}}$ ty)$(\frac{2}{5})^{3-2x} = \frac{125}{8}$ u)$3^{2-3x} = 81^{4x+1}$ v)$(\frac{1}{27})^{x-1} = (\frac{1}{9})^x$ w)$(\frac{1}{64})^{\sqrt{x+2}} = 0,5$ x)$4^x = 8^{2x-1}$ y)$4^{2x} = \sqrt[3]{128}$ z)$(\frac{25}{9})^{x^2-12} = (\frac{3}{5})^{9-x}$ zs)$\sqrt[3]{4^x} = \sqrt{2^{3x+1}}$

3. a)$(\frac{1}{8})^{\frac{3x-7}{x-3}} = \frac{1}{2}$ b)$(\frac{9}{4})^x = \frac{8}{27}$ c)$3^{-4x} = \frac{1}{\sqrt{3}}$ d)$100{\cdot}2^x = 10^{3x+3}{\cdot}5^{-x}$ e)$3{\cdot}81^4{\cdot}27^{x+1} = 9^{x^2}$ f)$4^{x^2}{\cdot}8{\cdot}16^{-\frac{3x}{4}} = 64^{x-1}$ g)$3^{3^x} = 27^{27}$ h)$5^{5^x} = 5^{3x}$ i)$(\frac{2}{3})^x{\cdot}(\frac{9}{8})^x = \frac{27}{64}$ j)$\frac{1}{8}{\cdot}2^{x^2} = 4^x$ k)$3^{x^2} = 27{\cdot}9^x$ $9^{\sqrt{x}} = 3^{x-3}$ l)$3^{-\frac{x}{2}+1} = 9$ m)$1000{\cdot}(0.1)^{\frac{1}{x}} = 100^x$ n)$0,11^{x^3-5} = 0,001331$ o)$4^{\frac{1}{x}-2} = \frac{1}{4}$ p)$3^x{\cdot}(\frac{1}{3})^{x-3} = (\frac{1}{27})^x$ q)$7^{1-|x|=49}$ r)$6^{|x|} = 36$ s)$2^{x^2-6x-2,5} = 16\sqrt{2}$ sz)$32^{\frac{x+5}{x-7}} = 0,25{\cdot}128^{\frac{x+17}{x-3}}$ t)$0,1^{-(x^2-5x+8)} = 100$ ty)$(\frac{2}{3})^{3x}{\cdot}(\frac{81}{16})^{4x-3} = \frac{4096}{531441}$ v)$2{\cdot}((2^{\sqrt{x}+3})^{\frac{1}{\sqrt{x}}})^{\frac{1}{\sqrt{x}-1}} = 4$ w)$5^{(x^2+x-2)(3-x)} = 1$

4. a)$(\frac{3}{4})^{x-4} = 1$ b)$7^x = 0$ c)$2^x = -2$ d)$(\frac{1}{2}) = 0$ e)$(\frac{3}{2})^x = 1$ f)$5^x = 3^x$ g)$2^{x^2-7x+12} = 1$ h)$5^{x^2-8x+12} = 1$ i)$2^{x-2} = 5^{2-x}$ j)$8^{5-x} = 7^{x-5}$ k)$3^{x-4} = 2^{x-4}$ l)$4^{2x-3} = 7^{x-1,5}$ m)$7^{x-3} = 4^{2x-6}$ n)$0,5^{\sqrt{x-3}} = 1$ o)$(\frac{1}{5})^{x^2-x-2} = 1$ p)$2^x - 3^x = 0$ q)$2^x + 3^x = 0$ r)$(\frac{3}{7})^{3x-7} = (\frac{7}{3})^{7x-3}$

5. a)$10^{3x+2} = 5^{4x+1}{\cdot}2^{2x+3}$ b)$12^{9-x} = 3^{x-1}{\cdot}2^{3x-7}$ c)$21^{2x+4} = 3^{x+8}{\cdot}7^{3x}$ d)$0,5^{2x-2}{\cdot}2^{x^2} = 32$ e)$7{\cdot}3^{x+1} - 5^{x+2} = 3^{x+4} - 5^{x+3}$ f)$3^{x+1} + 3^{x-1} + 3^{x-2} = 5^{x-1} + 5^x + 5^{x-2}$ g)$0,5^{2x-2}{\cdot}2^{x^2} = 32$ h)$\sqrt{2^{x-1}} = \sqrt[7]{0,5^{6-4x}}$ i)$8{\cdot}0,5^{12-x} = 2^{x-6}$ j)$4^{x-4}{\cdot}2^{\sqrt{x+1}} = 1$ k)$0,04^{3x-2} = 5^{2-x}$ l)$\frac{1}{16^{x+2}}{\cdot}2^{x^2} = 32$ m)$4^x - 3^{x-\frac{1}{2}} = 3^{x+\frac{1}{2}} - 2^{2x-1}$ n)$9^x - 2^{x+\frac{1}{2}} = 2^{x+\frac{7}{2}} - 3^{2x-1}$ o)$9^x - 4^{x-\frac{1}{2}} = 4^{x+1} - 3^{2x-1}$

6. a)$2^{x+3} - 2^x = 112$ b)$10^{x-1} + 10^x = 0,11$ c)$2^{x+2} + 2^{x-2} = 34$ d)$2^{x-1} + 2^{x-2} + 2^{x-3} = 896$ e)$5^{x+2} - 3{\cdot}5^{x+1} + 5^x = 55$ f)$7^{x+1} - 6{\cdot}7^x - 5{\cdot}7^{x-1} = 14$ g)$2{\cdot}3^{x+3} - 5{\cdot}3^{x-2} = 1443$ h)$3^{x-2} + 4{\cdot}3^{x-1} + 5{\cdot}3^x - 2{\cdot}3^{x+1} = 4$ i)$7^{x+2} - \frac{1}{7}{\cdot}7^{x+1} - 14{\cdot}7^{x-1} + 2{\cdot}7^x = 48$ j)$10^x - 5^{x-1}{\cdot}2^{x-2} = 950$ k)$6^x + 6^{x+1} = 2^x + 2^{x+1} + 2^{x+2}$ l)$3^x + 3^{x+1} + 3^{x+2} = 7^x + 7^{x+1} + 7^{x+2}$ m)$2^{\sqrt{x}+2} - 2^{\sqrt{x}+1} = 12 + 2^{\sqrt{x}-1}$ n)$5^{4x-3} - 4{\cdot}5^{4x-1} + 8{\cdot}5^{4x+1} = 24505$ o)$25{\cdot}5^{x+1} + 4{\cdot}5^x + 5^{x-1} = 646$ p)$3{\cdot}4^x + \frac{1}{3}{\cdot}9^{x+2} = 6{\cdot}4^{x+1} - \frac{1}{2}{\cdot}9^{x+1}$ q)$7{\cdot}2^{x+2} - 3{\cdot}2^{x+3} = 3^{x+2} - 3^{x+1}$ r)$\sqrt{2^{x+14}} - \sqrt{2^{x+12}} = 64$ s)$\sqrt{3^{x-54}} - 7{\cdot}\sqrt{3^{x-58}} = 162$

7. a)$7^{2x} - 6{\cdot}7^x + 5 = 0$ b)$4^x - 9{\cdot}2^x + 8 = 0$ c)$4^x + 2^{x+1} = 8$ d)$3^{x+2} + 9^{x+1} = 810$ e)$3^{2x+1} - 3^{x+2} = 162$ f)$2^{4x-1} - 15{\cdot}2^{2x-3} = 98$ g)$2^{4x-1} - 9{\cdot}2^{2x-3} = 98 - 3{\cdot}2^{2x-2}$ h)$2^{2+x} - 2^{2-x} = 15$ i)$5^{2x-1} + 5^{x+1} = 250$ j)$3^{2x+2} - 12{\cdot}3^{x+1} + 27 = 0$ k)$5^x + \frac{125}{5^x} = 30$ l)$4{\cdot}5^{2x} - 3{\cdot}5^{x+1} - 25 = 0$ m)$5^x + 0,2^x = 4,8$ n)$6{\cdot}2^{2x} - 13{\cdot}6^x + 6{\cdot}3^{2x} = 0$ o)$4^{\sqrt{x}} - 3{\cdot}2^{\sqrt{x}} + 2 = 0$ p)$9^{x-1} + 3^{x+2} = 90$ q)$3^{4\sqrt{x}} - 4{\cdot}3^{2\sqrt{x}} + 3 = 0$ r)$(3^{x+1} + 2{\cdot}3^x){\cdot}(3^{x+1} - 2{\cdot}3^x) - 12{\cdot}3^{x+2} = 729$ s)$2^x - 3{\cdot}2^{\frac{x-3}{2}} = 26$ sz)$9^{x+\frac{1}{2}} + 26{\cdot}3^{x-1} = 1$ t)$3^{4-x} + 3^{x-1} = 12$ ty)$4^{x-2} - 4^{2-x} = \frac{63}{8}$ u)$2^{x+1} + 2^{-x} = 3$ v)$\frac{8^x + 27^x}{12^x + 18^x} = \frac{7}{6}$ w)$9^{x+\sqrt{x^2+2}} - 4{\cdot}3^{x-1+\sqrt{x^2+2}} = 69$ x)$4{\cdot}3^x - 9{\cdot}2^x = 5{\cdot}6^{\frac{x}{2}}$ y)$33{\cdot}2^{x-1} - 4^{x+1} = 2$ z)$3^{\sqrt[3]{x^2}} = 3{\cdot}3^{\sqrt[3]{x}+1}$ zs)$4^{x+1.5} + 4{\cdot}9^{x-1} = 6^{x+1}$

8. a)$(\frac{4}{9})^x{\cdot}(\frac{27}{8})^x = \frac{2}{3}$ b)$(\frac{1}{2})^{\frac{2x-3}{2x-1}} = (\frac{1}{4})^{\frac{x+9}{2x+2}}$ c)$\frac{16^x + 4^{x+1}}{3{\cdot}16^x - 4^{x-1}} = \frac{18}{5}$ d)$3^{2+4\sqrt{x}} - 4{\cdot}3^{2+2\sqrt{x}} + 27 = 0$ e)$\frac{9^x}{4^x} + \frac{4^x}{9^x} = \frac{13}{6}$ f)$\frac{3{\cdot}2^x - 1}{2{\cdot}2^x - 1} + \frac{2{\cdot}2^x - 1}{3{\cdot}2^x - 1} = \frac{5}{2}$ g)$(x^2 - x + 1)^{x-2} = 1$ h)$5^{3x} + 9{\cdot}5^x + 27{\cdot}5^{-3x} = 64 - 27{\cdot}5^{-x}$ i)$x^{\log_2 x} < 32$

9. a)$3^x \geq 81$ b)$2^x \leq 8$ c)$0,1^x < 100$ d)$(\frac{1}{3})^x \leq \frac{1}{9}$ e)$(\frac{2}{3})^x \leq 1$ f)$0,5^{\frac{2}{x}} < 0,0625$ g)$(\frac{1}{3})^x \leq \frac{1}{27}$ h)$2^{\frac{x-1}{x+1}} > 1$ i)$3^{1-x} \geq 81$ j)$(\frac{1}{3})^{\frac{x+3}{x-3}} < 1$ k)$5^{2x-1} < 25$ l)$6^{x^2-7x+12} > 1$ m)$(\frac{3}{2})^{x-1} < (\frac{4}{9})^x$ n)$3^{-x^2+5x-8} < \frac{1}{9}$ o) $2^{(x-1)(x+2)} < 1$ p)$2^{x^2-8x+18} > 8$ q)$2^x + 2^{1-x} < 3$ r)$(x+3)^{x^2-5x+6} > 1$ s)$(x-2)^{x^2-6x+8} > 1$ sz)$2^{\sqrt{x^2-3x+3}} > 2^{\sqrt{x}}$ t)$0,5^{2-\frac{x-3}{x-2}} > 0,5^{\frac{x-2}{x-1}}$

10. a)$2^x = 5$ b)$3^{x-1}+\cdot 3^{x+2} = 2^{x+1}+2^{x+4}$ c)$3^{x^2-1}\cdot 5^{x-3} = 5,4$ d)$5^{x^2-5x+5}\cdot 7^{x-1} = 9,8$ e)$7^{x+1} - 6\cdot 7^x + 5\cdot 7^{x-1} = 14$ f)$5^x + 5^{x-1} + 5^{x-2} = 2^x + 2^{x-1} + 2^{x-2}$ g)$5^{2x+1} + 7^{x+1} = 35 + 175^x$ h)$10^x - 10^{-x} = \frac{8}{3}$ j)$3^x > 4$ k)$5^x - 5^{3-x} \leq 20$ l)$3^{2x} < 7\cdot 3^x + 9\cdot \log_3 9$

11. $a(x) = \log_2 x$ $b(x) = \log_{\frac{1}{2}} x$ $c(x) = -2\cdot \log_3 x$ $d(x) = \log_5 x + 3$ $e(x) = \log_5(x+3)$ $f(x) = -\log_2 2x$ $g(x) = \log_3(x-3) - 1$ $h(x) = 2\cdot \log_{\frac{1}{3}}(x+5) + 1$ $i(x) = \frac{1}{2}\cdot \log_3(5-x) - 1$ $j(x) = \log_{\frac{1}{2}}(-4-x) + 1$ $k(x) = -2\cdot \log_2(3-x) + 1$ $l(x) = -\log_5 \frac{x-1}{1-x}$ $m(x) = -\log_5 \frac{x^2-1}{1-x}$

12. Határozd meg a következő függvények értelmezési tartományát!
$a(x) = \log_2 \frac{x-1}{x+5}$ $b(x) = \log_{\frac{1}{2}}(x-1)\cdot(x+5)$ $c(x) = \log_{\frac{1}{3}} \frac{1-x}{x+3}$ $d(x) = \log_3(1-x)(x+3)$ $e(x) = \log_\pi x^2 - 5x + 6$ $f(x) = \log_\pi(x^2 - 5x + 6)$ $g(x) = \log_{\frac{1}{2}}(-x^2 + 2x - 2)$ $h(x) = \log_{\frac{1}{2}}(x^2 + 2x + 3)$ $i(x) = \log_{x-3}(x^2 + 2x + 3)$ $j(x) = \log_{\frac{1}{2}}(x^3 - 27)$ $k(x) = \log_{\frac{1}{2}}(x^4 - 81)$ $l(x) = \log_{\frac{1}{2}}(x^3 + 27)$ $m(x) = \log_{\frac{1}{2}}(x^4 + 81)$ $n(x) = \log_{\frac{1}{2}} |x-5| - 3$ $o(x) = \log_{\frac{1}{2}} |x-5| + 3$ $p(x) = \log_{x-4} -|x-5| + 6$ $q(x) = \lg \sqrt[2009]{x-1} - 1$ $r(x) = \log_{x-2009} \sqrt[2009]{x-1} + 1$ $s(x) = \log_{x-2009} \sqrt[2010]{x-1} - 1$ $sz(x) = \log_{x-2009} \sqrt[2010]{x-1} + 1$ $t(x) = \log_x \frac{-x^2+2x+3}{x^2-5x}$ $ty(x) = \log_{x-3} \frac{x^2-4x+4}{x+3}$ $u(x) = \ln \sin x$ $v(x) = \ln tgx + 1$ $w(x) = \ln \cos x + 1$

13. a)$\log_2 x = 4$ b)$\log_3 x = 2$ c)$\log_5 x = -2$ d)$\log_5 x = 23$ e)$\lg x = -1$ f)$\log_{0,1} x = -1$ g)$\log_{100} x = -\frac{2}{3}$ h)$\log_{0,3} x = 3$ i)$\log_{0,25} x = \frac{1}{4}$ j)$\lg x = 0,4343$ k)$\ln x = 0$ l)$\ln x = \frac{1}{2}$ m)$\ln x = -\frac{1}{2}$ n)$\ln x = -\frac{2}{3}$ o)$\log_{10000} x = -\frac{1}{4}$

14. a)$x = \log_2 2$ b)$x = \log_3 81$ c)$x = \lg 10^6$ d)$x = \log_5 1$ e)$x = \log_2 \sqrt{2}$ f)$x = \log_{\sqrt{2}} 2$ g)$x = \log_2 8$ h)$x = \log_4 8$ i)$x = \log_{16} 8$ j)$x = \log_7(\frac{1}{7})$ k)$x = \log_{49}(\frac{1}{\sqrt{7}})$ l)$x = \log_{343}(\frac{1}{\sqrt[3]{49}})$ m)$x = \ln(\frac{1}{\sqrt[4]{e^3}})$ n)$x = \ln 0$ o)$x = \lg(-10)$

15. a)$\log_x 9 = 2$ b)$\log_x \sqrt{5} = \frac{1}{2}$ c)$\log_x \frac{1}{3} = -1$ d)$\log_x 27 = -3$ e)$\log_x \frac{1}{8} = \frac{3}{2}$ f)$\log_x 8 = -\frac{1}{2}$ g)$\log_x 0,125 = -2$ h)$\log_x 36 = \frac{3}{2}$ i)$\log_x \frac{1}{64} = -3$ j)$\log_x(x+6) = 2$

16. a)$2^{\log_2 8}$ b)$2^{\log_2 5}$ c)$2^{\log_2 \pi}$ d)$2^{\log_2(-\pi)}$ e)$25^{\log_5 8}$ f)$\sqrt{2}^{\log_2 9}$ g)$\sqrt{2}^{\log_2 5}$ h)$2^{\log_{\sqrt{2}} 5}$ i)$25^{\log_5 10-1}$ j)$2^{\log_2 6-2}$ k)$5^{\log_{25} 7+1}$ l)$7^{\log_{\sqrt{7}} 5+\log_{49} 9}$ m)$3^{2-\log_{\sqrt{3}} 5}$ n)$13^{\log_{\sqrt{13}} 3+\log_{13} 2}$ o)$0,001^{\lg 3-1}+0,01^{\lg 0,3+0,5}$

17. a)$\log_3(x-12) = 2$ b)$\log_5(x+10) = 3$ c)$\log_{0,5}(5x-1) = -2$ d)$\log_{36}(x^2-10) = \frac{1}{2}$ e)$\log_3 |x| = 2$ f)$|\log_3 x| = 1$ g)$|\log_3 |x|| = 1$ h)$\log_2 |x-2| = 0$ i)$\lg |x-1| = 1$ j)$\log_3(x-4)(x-2) = 1$ k)$\log_8(x^2-2x-34) = 0$ l)$\log_{0,5}(x^2-5x+8) = -1$ m)$\log_2(x^2-5x+8) = 1$ n)$\log_x(6x+5x^2) = 3$ o)$\log_{x-1}(2x^2 - 9x - 13) = 2$ p)$\log_{2-x}(2x^2 + 7) = 2$ q)$\log_{x-1}(2x^3 + 2x^2 - 3x + 1) = 3$

18. a)$\lg(x-6) - \frac{\lg(2x-15)}{2} = 1 - \lg 5$ b)$\frac{\lg(3x-5)}{\lg(x-1)} = 1$ c)$\frac{\lg(6-2x)}{2} = \lg(x+1)$ d)$2\cdot \lg(x-4) - \lg 4 = \lg(2x-11)$ e)$2\cdot[\lg(x-2) + \lg 5] = 2 + \lg(x+46)$ f)$\frac{\lg(3x-5)}{\lg(2x-3)} = 1$ g)$\frac{\lg(3x-5)}{\lg(2x-3)} = 2$ h)$\frac{\lg(x^2-20)}{\lg(x+10)} = 1$ i)$\frac{\log_x(35-x^3)}{\log_x(5-x)} = 3$ j)$2 - \lg x = \lg 2 + \lg 4 + \lg 25$ k)$2\cdot \lg 5 + \lg x = 1 - \lg 2$ l)$\lg(x-9)+\lg(2x-1) = 2$ m)$\lg(x-4)+\lg(x+3) = \lg(5x+4)$ n)$\ln(x^3+1)-\frac{1}{2}\cdot \ln(x^2+2x+1) = \ln 3$ o)$\lg(x-3)+\lg(x-2) = 1-\lg 5$ p)$2\cdot \log_3(x-2)+\log_3(x-4)^2 = 0$ q)$\frac{\lg(2x+5) - \lg x}{2 + \lg 100} = \frac{1}{4}$ r)$2\cdot \log_2(\frac{x-7}{x-1}) + \log_2(\frac{x-1}{x+1}) = 1$ s)$\frac{\lg x}{\lg x - \lg 2} = 3$ sz)$\frac{\lg 2x}{\lg |4x-15|} = 2$ t)$\lg \sqrt{x^2-4x} - \lg \sqrt{4-x} = 0$ ty)$\lg \sqrt{x-1} + \frac{1}{2}\cdot \lg(2x+3) = \lg 15$

19. a)$\log_2 \log_3 \log_4 x = 1$ b)$\log_3 \log_8 \log_5 x = -1$ c)$\log_4 \log_3 \log_2 x = 0$ d)$\log_2 \log_4 \log_3 x = -1$ e)$\log_2 \log_3 \log_4 x = 0$ f)$\log_5 \log_{0,5} \log_{0,25} x = 1$ g)$\log_2[1 + \log_5(3 + \log_3 x)] = 1$ h)$\log_3[2 + \log_6(9 - \log_2 x)] = 1$ i)$\log_{\frac{1}{3}}[\log_5 x + \log_5(x-20)] = -1$ j)$\log_3 \log_4 \log_3^2(x-3) = 0$ k)$\lg \lg \lg p = 0$ $p \in \mathbb{R}^+$ l)$\log_a \log_b \log_c x = p$ $a, b, c \in \mathbb{R}^+ \setminus \{0\}$

20. a)$\log_6 \sqrt{x} + \log_{\frac{1}{6}} x = \log_{36} x - 3$ b)$\log_2 x^2 - 3\cdot \log_4 x = 4 - \log_8 \sqrt{x}$ c)$\log_{\frac{1}{2}} \sqrt[4]{x} - \log_{\frac{1}{4}} \sqrt{x^3} = 1 + \log_{\frac{1}{8}} \dfrac{1}{\sqrt[4]{x^3}}$ d)$\log_2 x + \log_8 x = 8$ e)$\log_2 x + \log_4 x = 1$ f)$\log_2(x-1)^2 + \log_{\frac{1}{2}}(x-1) = 9$ g)$\log_2 x + \log_4 x + \log_{16} x = 7$ h)$\log_3 x + \log_{\sqrt{3}} x + \log_{\frac{1}{3}} x = 6$ i)$\log_{\sqrt[4]{x}} x + \log_3 x - \log_{\frac{1}{3}} x = 8$

21. a)$\log_9 x = 0,5\cdot \log_x 3$ b)$2\cdot \log_x 25 - 3\cdot \log_{25} x = 1$ c)$\log_x 4 + \log_4 x = 2$ d)$\log_x 4 + \log_4 x = \dfrac{5}{2}$ e)$\log_9 x + \log_{x^2} 3 = 1$ f)$\log_3 x - 6\cdot \log_x 3 = 5$ g)$\log_{3x}(\dfrac{3}{x}) + \log_3^2 x = 1$ h)$2\cdot \log_x 3 + \log_{3x} 3 + 3\cdot \log_{9x} 3 = 0$ i)$\log_{x^2} 16 + \log_{2x} 64 = 3$ j)$\log_4^2(x-1)^4 - \log_{\frac{1}{2}}(x-1) = 5$ k)$\log_x 2 - \log_4 x + \dfrac{7}{6} = 0$ l)$4^{\log_{3x} 6} - 2^{\log_{3x} 6} - 2 = 0$ m)$3^{1+\log_{\sqrt{2}} x} - 9^{\log_{\sqrt{2}} x} = 108$ n)$7^{\log_x 9} - 7^{\log_x 3} - 42 = 0$

22. Hány egynél nagyobb gyöke van a $\log_{2x}(\dfrac{2}{x}) \log_2^2 x + \log_2^4 x = 1$ egyenletnek? Ha léteznek ilyen gyökök, akkor határozzuk meg az értéküket!

23. a)$2^{3+\log_2 24} = 3\cdot 2^{\frac{1}{x}}$ b)$5^{1+\log_5 \cos x} = 2,5$ c)$3^{\lg tgx} + 3^{\lg ctgx} = 2$ d)$x^{\lg x} = 1$ e)$x^{\lg x} = 100x$ f)$x^x = x$ g)$x^{1-\lg x} = 0,01$ h)$x^{\lg \sqrt{x}} = 100$ i)$x^{\sqrt{x}} = (\sqrt{x})^x$ j)$\sqrt[3]{x^x} = x^{\sqrt[3]{x}}$ k)$x^{\log_2 x} = \sqrt[4]{512}$ l)$(\dfrac{1}{2})^x = \log_2(x + \dfrac{1}{x})$

24. Oldjuk meg grafikusan: a)$3^x = x + 4$ b)$\log_2 x = x - 2$ c)$2^x = 4 - x^2$

25. a)$\log_2(x+3) > \log_2 4$ b)$\log_{\frac{1}{3}} 5x \le \log_{\frac{1}{3}} 25$ c)$\log_4(2x-4) > 0$ d)$\log_4(2x-4) < 0$ e)$\log_{\frac{1}{2}}(5x-12) < 0$ f)$\log_{\frac{1}{2}}(5x-12) > 0$ g)$\log_{\frac{1}{2}} \dfrac{3-x}{3x-1} < 0$ g)$\log_{\frac{1}{3}} \dfrac{3x-1}{x+2} < 1$ h)$\log_{0,3}(x+1) < 1$ i)$\log_8 \dfrac{x^2-2x}{x-3} > 1$ j)$\log_{\frac{1}{2}}^2 x > 36$ k)$\log_{x^2-3} 729 > 3$ l)$\log_\pi(x+27) - \log_\pi(16-2x) < \log_\pi x$ m)$\lg(x+8) \ge \lg(x^2-3x-4)$ n)$\log_2(3-x) - \log_2(x-1) < \log_{\sqrt{2}} 3$ o)$\dfrac{1}{\log_2 x} - \dfrac{1}{\log_2 x - 1} < 1$ p)$\log_x \sqrt{20-x} > 1$ q)$\log_{\frac{1}{3}}(\log_4(x^2-5)) > 0$ r)$\log_2(\log_{\frac{1}{2}}(2^x - 4^x)) \le 1$ s)$1 + \log_2(x+1) > -\log_{0,5}(4-x^2)$ sz)$\log_{\frac{1}{2}} x > -\log_3 x > 1$ t)$(2x^2-11x-13)\log_{0,5}(7-x) > 0$ ty)$|\log_2 x| < 1$ u)$|\log_{\frac{1}{2}} x| > 2$ ü)$\log_{x^2-3}(4x+2) \ge 1$ v)$\log_{|x|}(x-1) < 2$ w)$\log_{\frac{2}{3}|x-2|} 2^{1-x^2} \ge 0$ x)$\log_{9-x^2} \cos x \log_{\frac{1}{2}}(9-x^2) > 1$ y)$\log_{\cos x} \log_{\sin x} tgx > 0$

26.

a) $\begin{cases} 9^{x+y} = 729 \\ 3^{x-y-1} = 1 \end{cases}$

b) $\begin{cases} 4^{x-y} = 16 \\ 2^{xy} = 256 \end{cases}$

c) $\begin{cases} 2^x - 2^y = 768 \\ 2^{x-1} + 2^{y-1} = 640 \end{cases}$

d) $\begin{cases} 2^{\frac{x-y}{2}} - 2^{\frac{x-y}{4}} = 2 \\ 2y - x = 1 \end{cases}$

e) $\begin{cases} y^{x^2+7x+12} = 1 \\ x + y = 6 \end{cases}$

f) $\begin{cases} 7^x - 12y = 0 \\ 3^x - 7y = 0 \end{cases}$

g) $\begin{cases} 3\cdot 3^x - 2^y = 5 \\ 5\cdot 3^x + 2\cdot 2^y = 23 \end{cases}$

h) $\begin{cases} 2^x + 5\cdot 7^y = 7 \\ 2^x - 3\cdot 7^y = -1 \end{cases}$

i) $\begin{cases} 3^x\cdot 5^x = 75 \\ 3^y\cdot 5^x = 45 \end{cases}$

j) $\begin{cases} 7^{x+1} - 6^{y+3} = 1 \\ 6^{y+2} - 7^x = 5\cdot(6^y + 1) \end{cases}$

k) $\begin{cases} 64^{2x} + 64^{2y} = 12 \\ 64^{x+y} = 4\sqrt{2} \end{cases}$

l) $\begin{cases} 9\cdot 5^x + 7\cdot 2^{x+y} = 457 \\ 6\cdot 5^x - 14\cdot 2^{x+y} = -890 \end{cases}$

m) $\begin{cases} 9^{x^2} \le 3^{-x} \\ x^2 + \dfrac{x}{2} \ge 0 \end{cases}$

n) $\begin{cases} \lg x - \lg y = 3 \\ \lg x + \lg y = 5 \end{cases}$

o) $\begin{cases} \lg x - \lg y = 2 \\ x - 10y = 900 \end{cases}$

p) $\begin{cases} \log_3(2x+y) + \log_3(2x-y) = 1 \\ \log_2(2x+y) + \log_2(2x-y) = 1 \end{cases}$

q) $\begin{cases} \log_2 \log_3(x+y) = 1 \\ \lg x + \lg y = 3\lg 2 \end{cases}$

r) $\begin{cases} \lg(x+y) - \lg(x-y) = 2\lg 2 + \lg 3 \\ \lg(x^2+y^2+10) = 2 + \lg 3 \end{cases}$

s) $\begin{cases} \log_2 xy = 5 \\ \log_{0,5} \dfrac{x}{y} = 1 \end{cases}$

t) $\begin{cases} \lg(x^2+y^2) = 2 - \lg 5 \\ \lg(x+y) + \lg(x-y) = 2\lg 1,2 + 1 \end{cases}$

u) $\begin{cases} \log_4 x - \log_2 y = 0 \\ x^2 - 5y^2 + 4 = 0 \end{cases}$

v) $\begin{cases} xy = 27 \\ x^{\log_3 y} = 9 \end{cases}$

w) $\begin{cases} \lg^2 x + \lg^2 y = 7 \\ \lg x - \lg y = 2 \end{cases}$

x) $\begin{cases} \log_y x + \log_x y = 2 \\ x^2 + y = 12 \end{cases}$

y) $\begin{cases} \log_{xy}(x^2-y^2) = 0 \\ \log_{xy}(x^2+y^2) = 0 \end{cases}$