

## FÜGGVÉNYEK

1. Határozza meg a következő összetett függvényeket!

$$[g \circ f = g(f(x)); f \circ g = f(g(x))]$$

(a) **B**  $f(x) = \cos x + x^2; g(x) = \sqrt{x}; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \cos(\sqrt{x}) + (\sqrt{x})^2 = \cos(\sqrt{x}) + x; g(f(x)) = \sqrt{\cos x + x^2}]$$

(b) **B**  $f(x) = \sin x; g(x) = x^2; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \sin(x^2) = \sin x^2; g(f(x)) = (\sin x)^2 = \sin^2 x]$$

(c) **B**  $f(x) = \frac{x}{1+x^2}; g(x) = \operatorname{tg} x; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \frac{\operatorname{tg} x}{1+(\operatorname{tg} x)^2} = \frac{\operatorname{tg} x}{1+\operatorname{tg}^2 x}; g(f(x)) = \operatorname{tg} \left( \frac{x}{1+x^2} \right)]$$

(d) **B**  $f(x) = \ln x + 4x^5; g(x) = e^x; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \ln(e^x) + 4(e^x)^5 = x + 4e^{5x}; g(f(x)) = e^{\ln x + 4x^5}]$$

(e) **B**  $f(x) = x^2 - 3x; g(x) = \sqrt{5-2x}; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = (\sqrt{5-2x})^2 - 3\sqrt{5-2x} = 5 - 2x - 3\sqrt{5-2x};$$

$$g(f(x)) = \sqrt{5 - 2(x^2 - 3x)} = \sqrt{5 - 2x^2 + 6x}]$$

(f) **B**  $f(x) = 1 - x + x^2; g(x) = e^x; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = 1 - e^x + (e^x)^2 = 1 - e^x + e^{2x}; g(f(x)) = e^{1-x+x^2}]$$

(g) **B**  $f(x) = \cos(7-x); g(x) = x^4 - 3x + 2; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \cos(7 - (x^4 - 3x + 2)) = \cos(-x^4 + 3x + 5);$$

$$g(f(x)) = (\cos(7-x))^4 - 3\cos(7-x) + 2 = \cos^4(7-x) - 3\cos(7-x) + 2]$$

(i) **B**  $f(x) = \sqrt[3]{2-3x}; g(x) = 4x - x^3; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \sqrt[3]{2-3(4x-x^3)} = \sqrt[3]{2-12x+3x^3};$$

$$g(f(x)) = 4\sqrt[3]{2-3x} - (\sqrt[3]{2-3x})^3 = 4\sqrt[3]{2-3x} - 2 + 3x]$$

(h) **B**  $f(x) = \sqrt[5]{4-x}; g(x) = x^5 - 3x; f(g(x)) = ?; g(f(x)) = ?$

$$[f(g(x)) = \sqrt[5]{4-(x^5-3x)} = \sqrt[5]{4-x^5+3x};$$

$$g(f(x)) = (\sqrt[5]{4-x})^5 - 3\sqrt[5]{4-x} = 4 - x - 3\sqrt[5]{4-x}]$$

2. Határozza meg a hiányzó függvényeket!

(a)  $f(x) = \sin x; g(x) = ?; f(g(x)) = \sin(x+4)$

$$[g(x) = x + 4]$$

(b) **B**  $f(x) = ?; g(x) = \cos x; f(g(x)) = \cos^4 x + 3 \cos x$

$$[f(x) = x^4 + 3x]$$

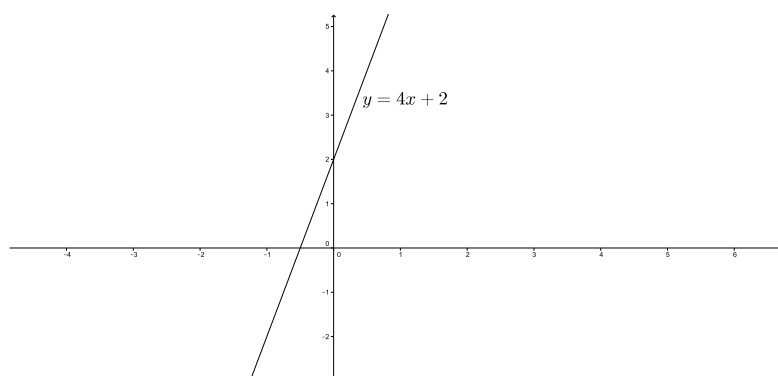
(c) **B**  $f(x) = ?; g(x) = x^2 - e^x; g(f(x)) = x - e^{\sqrt{x}}$

$$[f(x) = \sqrt{x}]$$

(d) **B**  $f(x) = x^2; g(x) = ?; g(f(x)) = \frac{x}{1+x^4}$

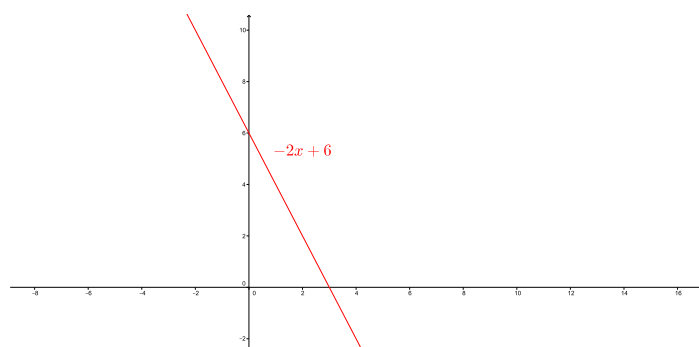
$$[g(x) = \frac{\sqrt{x}}{1+x^2}]$$

3. Ábrázolja az alábbi  $f : R \rightarrow R$  függvényeket, majd olvassa le a függvények értelmezési tartományát és értékkészletét!

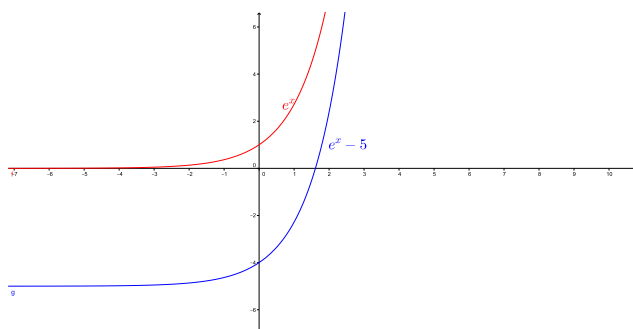


(a)  $f(x) = 4x + 2$   
[ $D(f) = \mathbb{R}; R(f) = \mathbb{R}$  ]

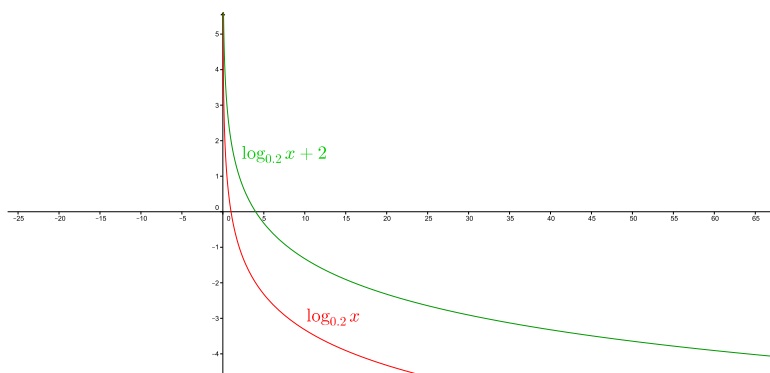
(b)  $f(x) = -2x + 6$   
[ $D(f) = \mathbb{R}; R(f) = \mathbb{R}$  ]



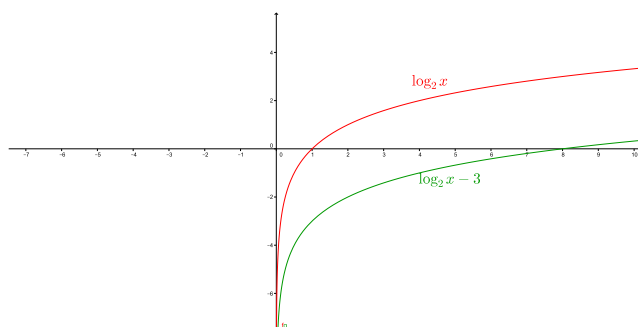
(c)  $f(x) = e^x - 5$   
[ $D(f) = \mathbb{R}; R(f) = ] - 5; \infty[$  ]



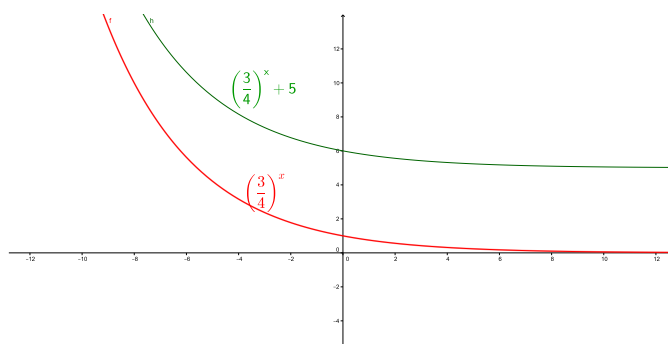
(d)  $f(x) = \log_{0,2} x + 2$   
[ $D(f) = ]0; \infty[; R(f) = \mathbb{R}$  ]



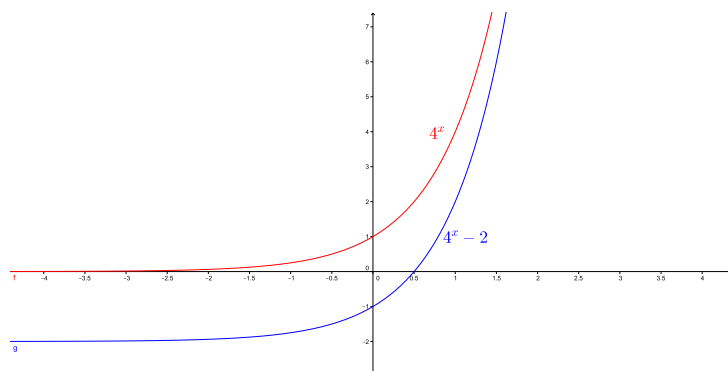
(e)  $f(x) = \log_2 x - 3$   
 $[D(f) = ]0; \infty[; R(f) = R ]$



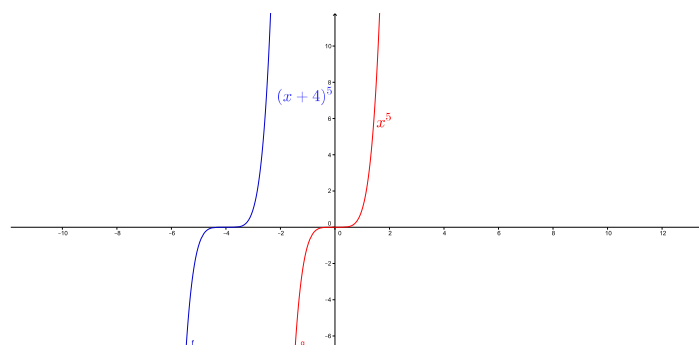
(f)  $f(x) = \left(\frac{3}{4}\right)^x + 5$   
 $[D(f) = R; R(f) = ]5; \infty[ ]$



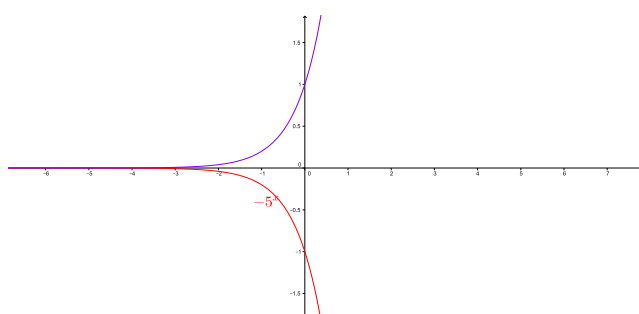
(g)  $f(x) = 4^x - 2$   
 $[D(f) = R; R(f) = ] - 2; \infty[ ]$



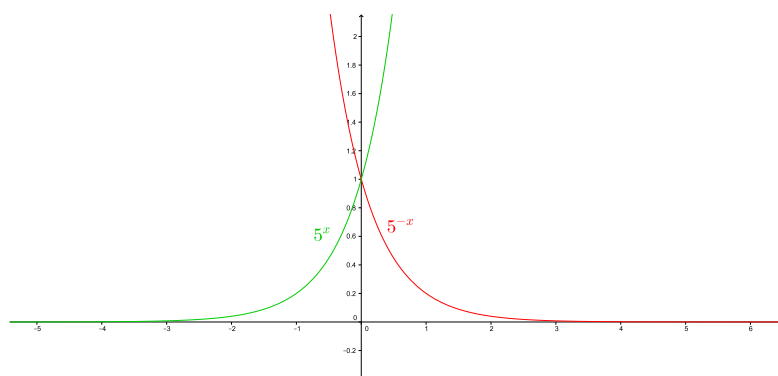
(h)  $f(x) = (x + 4)^5$   
 $[D(f) = \mathbb{R}; R(f) = \mathbb{R}]$



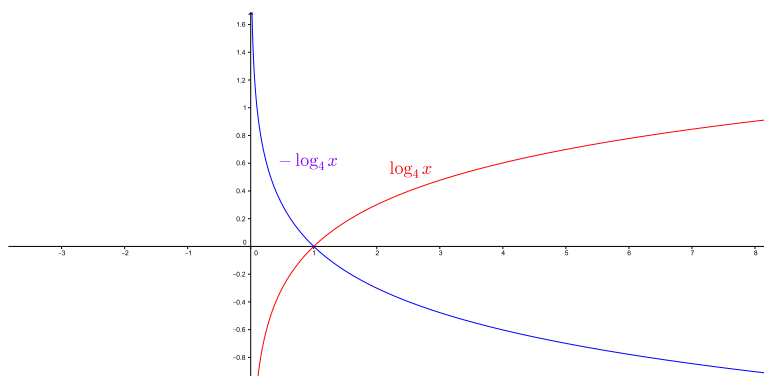
(i)  $f(x) = -5^x$   
 $[D(f) = \mathbb{R}; R(f) = ] - \infty; 0[ ]$



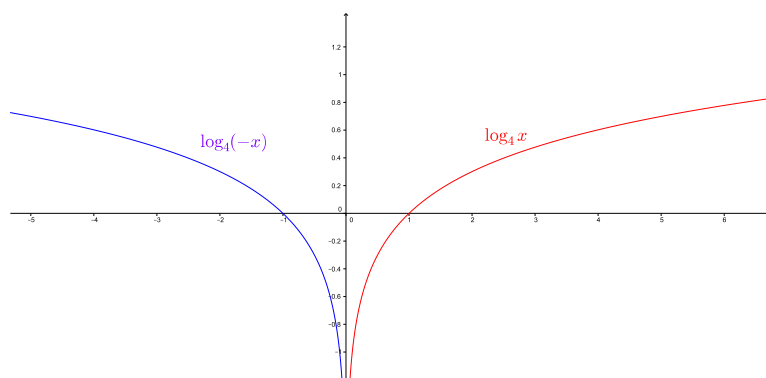
(j)  $f(x) = 5^{-x}$   
 $[D(f) = \mathbb{R}; R(f) = ]0; \infty[ ]$



(k)  $f(x) = -\log_4 x$   
 $[D(f) = ]0; \infty[; R(f) = R ]$

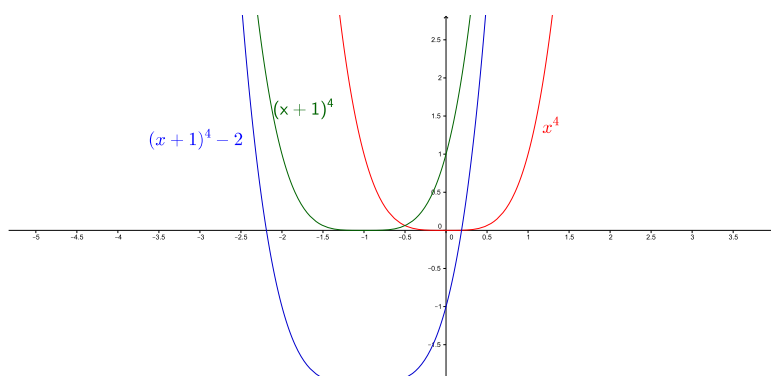


(l)  $f(x) = \log_4(-x)$   
 $[D(f) = ]-\infty; 0[; R(f) = R ]$

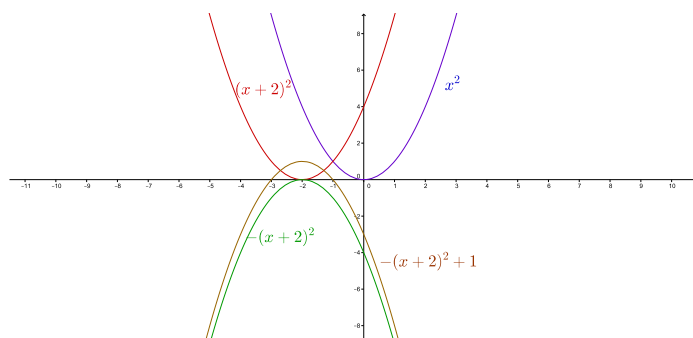


4. Ábrázolja az alábbi  $f : R \rightarrow R$  függvényeket, majd olvassa le a függvények értelmezési tartományát és értékkészletét!

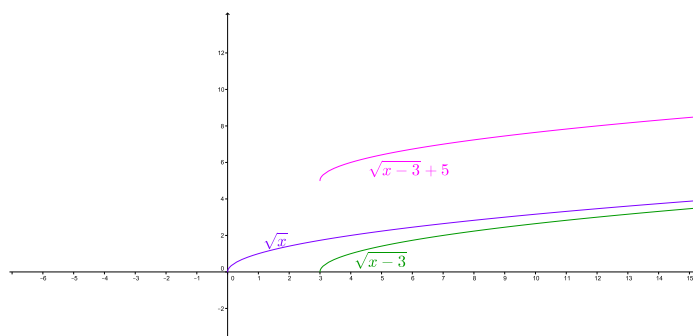
(a) **B**  $f(x) = (x + 1)^4 - 2$   
 $[D(f) = R; R(f) = [-2; \infty[ ]$



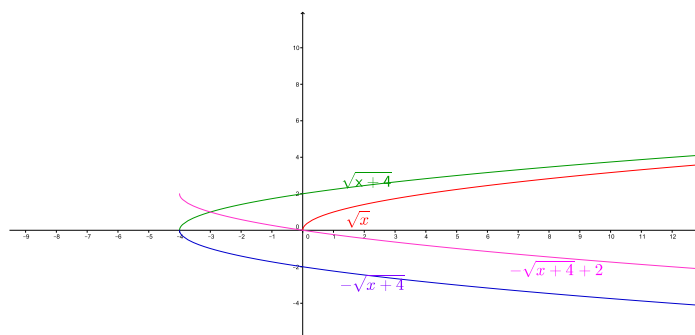
- (b) **V**  $f(x) = -(x+2)^2 + 1$   
 $[D(f) = \mathbb{R}; R(f) = ]-\infty; 1]$



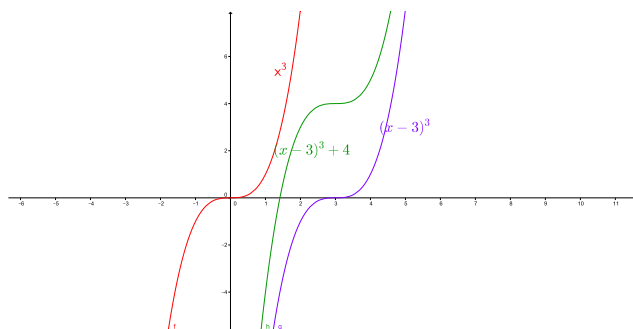
- (c) **B**  $f(x) = \sqrt{x-3} + 5$   
 $[D(f) = [3; \infty[; R(f) = [5; \infty[ ]$



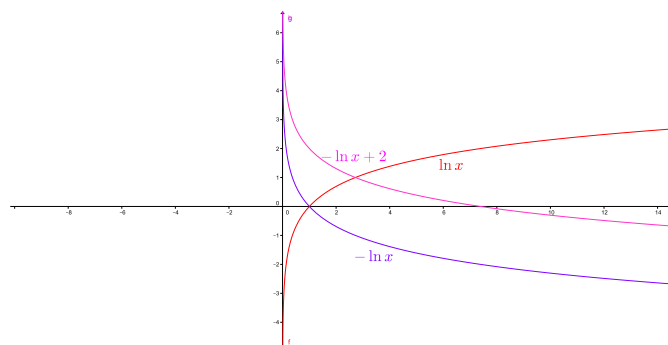
- (d) **V**  $f(x) = -\sqrt{x+4} + 2$   
 $[D(f) = [-4; \infty[; R(f) = ]-\infty; 2]$



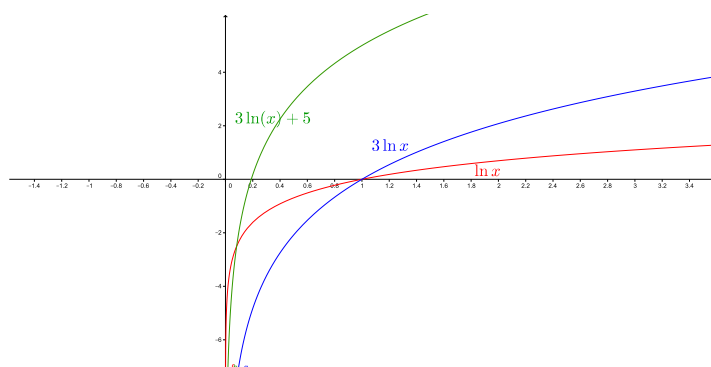
(e) **B**  $f(x) = (x - 3)^3 + 4$   
 $[D(f) = \mathbb{R}; R(f) = \mathbb{R}]$



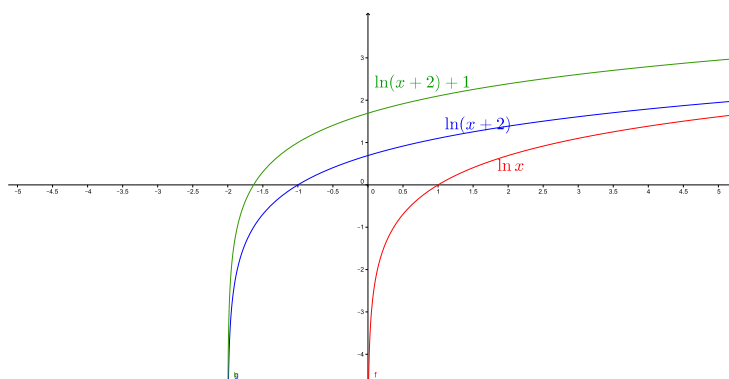
(f) **B**  $f(x) = -\ln x + 2$   
 $[D(f) = ]0; \infty[; R(f) = \mathbb{R}]$



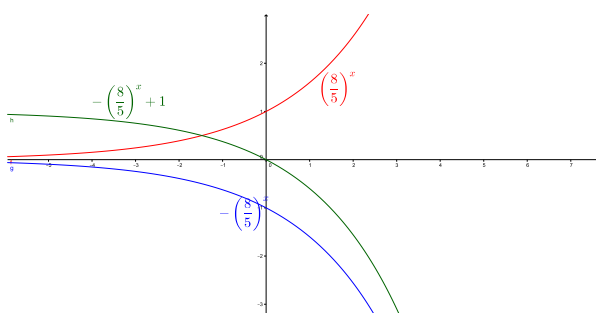
(g) **B**  $f(x) = 3 \ln x + 5$   
 $[D(f) = ]0; \infty[; R(f) = \mathbb{R}]$



- (h) **B**  $f(x) = \ln(x + 2) + 1$   
 $[D(f) = ] - 2; \infty[; R(f) = R ]$

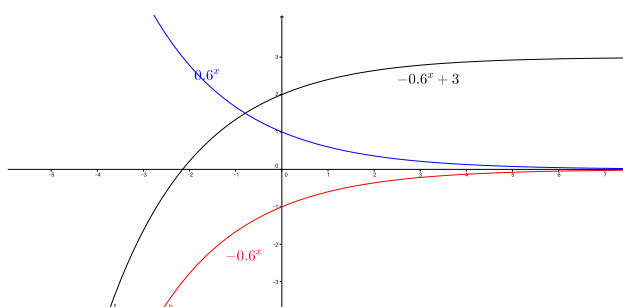


- (i) **B**  $f(x) = -\left(\frac{8}{5}\right)^x + 1$   
 $[D(f) = R; R(f) = ] - \infty; 1[ ]$

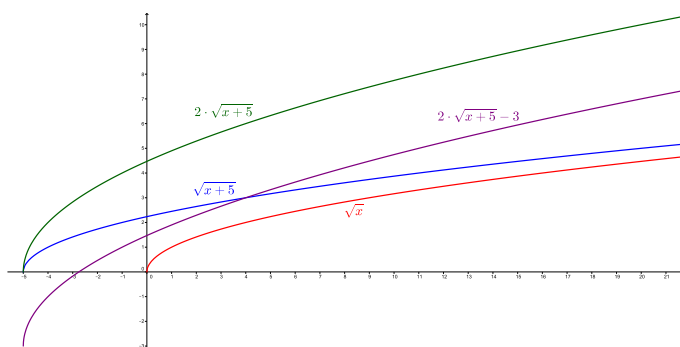


- (j) **B**  $f(x) = -0,6^x + 3$   
 $[D(f) = R; R(f) = ] - \infty; 3[ ]$

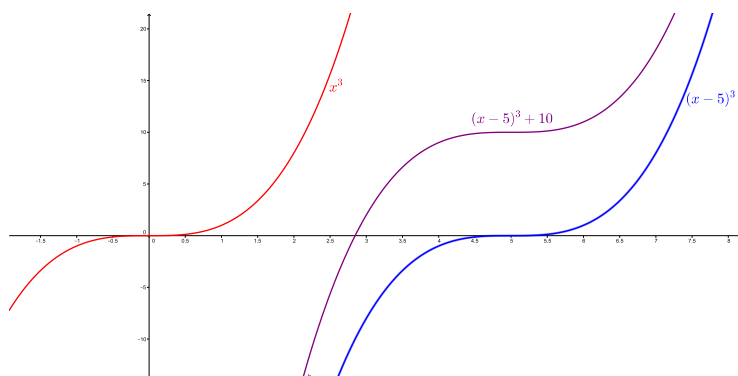




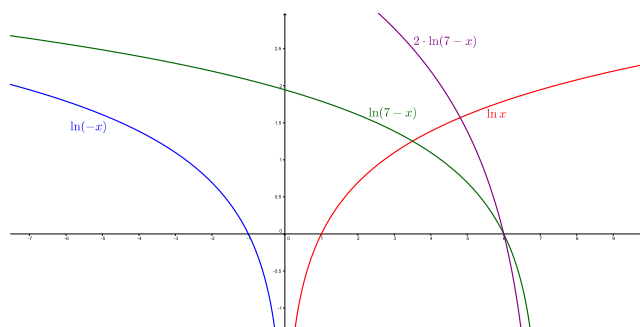
(k) **V**  $f(x) = 2\sqrt{x+5} - 3$   
 $[D(f) = [-5; \infty[; R(f) = [-3; \infty[ ]$



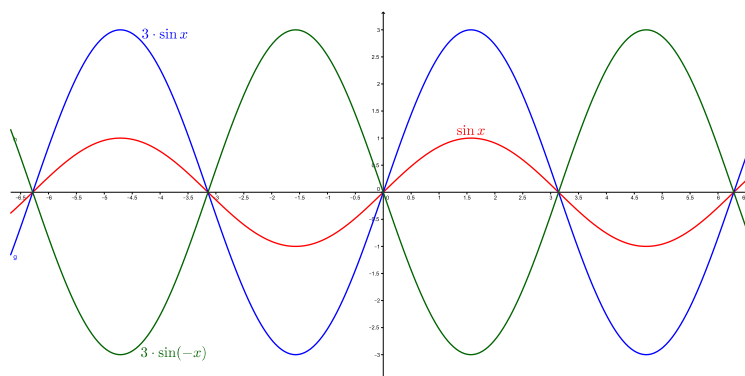
(l) **B**  $f(x) = (x-5)^3 + 10$   
 $[D(f) = \mathbb{R}; R(f) = \mathbb{R} ]$



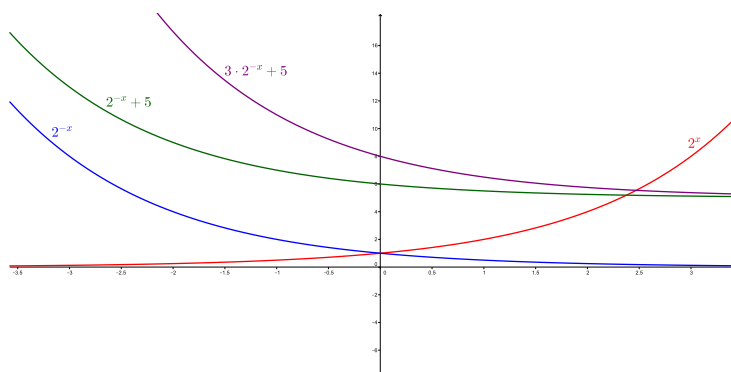
(m) **V**  $f(x) = 2 \ln(7-x)$   
 $[D(f) = ]-\infty; 7[; R(f) = \mathbb{R} ]$



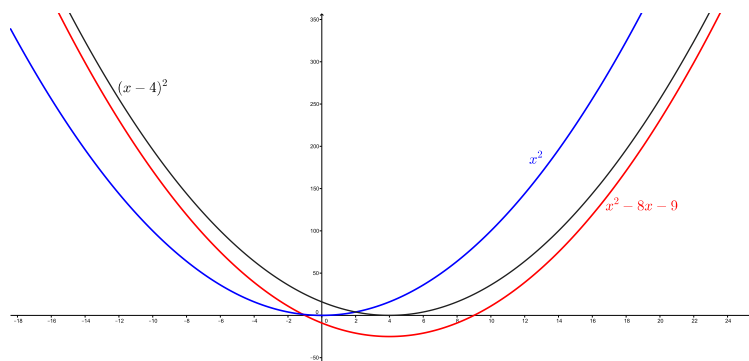
- (n) **B**  $f(x) = 3 \sin(-x)$   
 $[D(f) = \mathbb{R}; R(f) = [-3; 3] ]$



- (o) **V**  $f(x) = 3 \cdot 2^{-x} + 5$   
 $[D(f) = \mathbb{R}; R(f) = ]5; \infty[ ]$

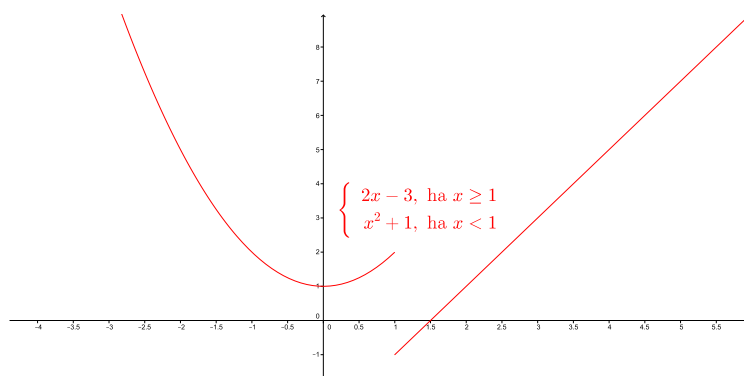


- (p) **V**  $f(x) = x^2 - 8x - 9$   
 $[x^2 - 8x - 9 = (x - 4)^2 - 25; D(f) = \mathbb{R}; R(f) = [-25; \infty[ ]$

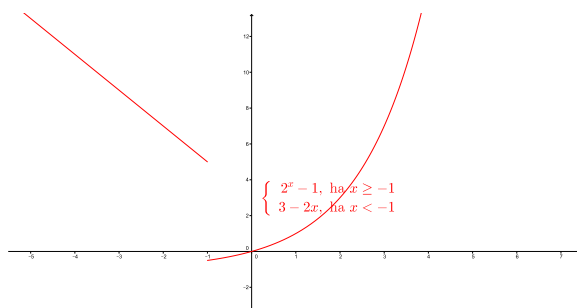


5. Ábrázolja az alábbi  $f : \mathbb{R} \rightarrow \mathbb{R}$  függvényeket, majd olvassa le a függvények értékkészletét!

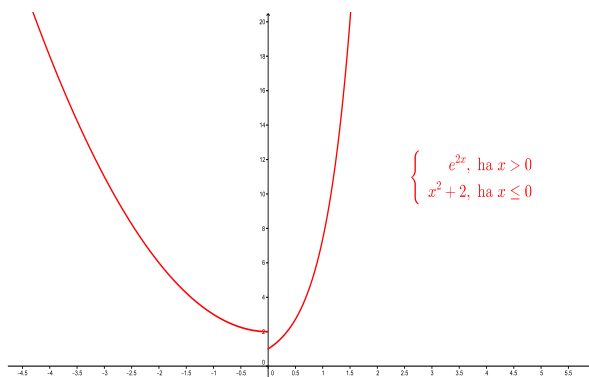
(a) **B**  $f(x) = \begin{cases} 2x - 3 & \text{ha } x \geq 1 \\ x^2 + 1 & \text{ha } x < 1 \end{cases}$   
 $[R(f) = [-1; \infty[ ]$



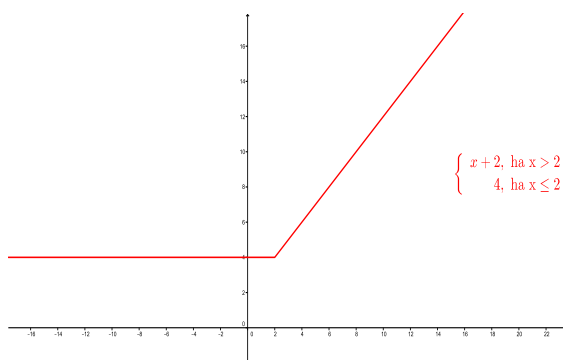
(b) **V**  $f(x) = \begin{cases} 2^x - 1 & \text{ha } x \geq -1 \\ 3 - 2x & \text{ha } x < -1 \end{cases}$   
 $[R(f) = [-0,5; \infty[ ]$



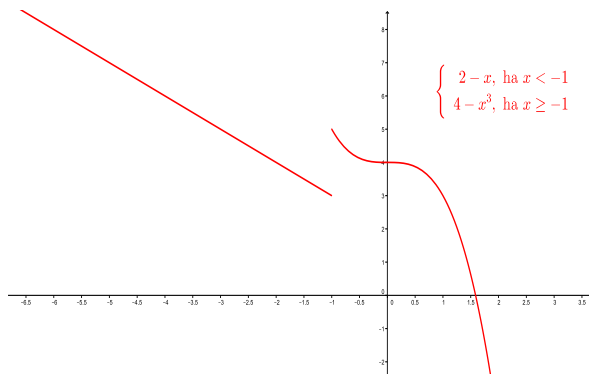
(c) **B**  $f(x) = \begin{cases} e^{2x} & \text{ha } x > 0 \\ x^2 + 2 & \text{ha } x \leq 0 \end{cases}$   
 $[R(f) = ]1; \infty[ ]$



(d) **B**  $f(x) = \begin{cases} x + 2 & \text{ha } x > 2 \\ 4 & \text{ha } x \leq 2 \end{cases}$   
 $[R(f) = [4; \infty[ ]$



(e) **V**  $f(x) = \begin{cases} 2 - x & \text{ha } x < -1 \\ 4 - x^3 & \text{ha } x \geq -1 \end{cases}$   
 $[R(f) = \mathbb{R} ]$



6. Határozza meg a valós számok legbővebb részhalmazát, melyen az adott függvény értelmezhető!

- (a)  $f(x) = \sqrt{4x - 8}$   $[4x - 8 \geq 0; D(f) = [2; \infty[$  ]
- (b)  $g(x) = \log_8(9 - 5x)$   $[9 - 5x < 0; D(g) = ] - \infty; \frac{9}{5}[$  ]
- (c)  $h(x) = \sqrt[7]{4x + 7}$   $[D(h) = \mathbb{R}]$  ]
- (d)  $f(x) = \frac{3x + 7}{8x + 9}$   $[8x + 9 \neq 0; D(f) = \mathbb{R} \setminus \{-\frac{9}{8}\}]$  ]
- (e)  $g(x) = e^{6x-7}$   $[D(g) = \mathbb{R}]$  ]
- (f)  $h(x) = \frac{8x}{\sqrt[5]{4x - 3}}$   $[\sqrt[5]{4x - 3} \neq 0; D(h) = \mathbb{R} \setminus \{\frac{3}{4}\}]$  ]
- (g)  $f(x) = \frac{4x - 5}{\sqrt{3x + 6}}$   $[\sqrt{3x + 6} \neq 0; 3x + 6 \geq 0; D(f) = ] - 2; \infty[$  ]
- (h)  $g(x) = \frac{5^{-x+7}}{8 - 5x}$   $[8 - 5x \neq 0; D(g) = \mathbb{R} \setminus \{\frac{8}{5}\}]$  ]
- (i) **B**  $h(x) = \sqrt[4]{x^2 + 3x - 10}$   $[x^2 + 3x - 10 \geq 0; D(h) = ] - \infty; -5[\cup]2; \infty[$  ]
- (j) **B**  $f(x) = \frac{3x^5 - 2}{\sqrt[3]{x^2 - 2x - 3}}$   $[\sqrt[3]{x^2 - 2x - 3} \neq 0; D(f) = \mathbb{R} \setminus \{-1; 3\}]$  ]
- (k) **B**  $f(x) = \frac{2}{\sqrt{x^2 - x - 20}}$   
 $[\sqrt{x^2 - x - 20} \neq 0; x^2 - x - 20 \geq 0; D(f) = ] - \infty; -4[\cup]5; \infty[$  ]
- (l) **B**  $f(x) = \sqrt{-x^2 + 6x - 8}$   $[-x^2 + 6x - 8 \geq 0; D(f) = [2; 4]]$  ]

7. Határozza meg a következő  $f : \mathbb{R} \rightarrow \mathbb{R}$  függvények legbővebb értelmezési tartományát!

- (a) **B**  $f(x) = \log_7(-x^2 + 4x + 12)$   $[-x^2 + 4x + 12 > 0; D(f) = ] - 2; 6[$  ]
- (b) **B**  $f(x) = 3^{\frac{4x-3}{-x+7}}$   $[-x + 7 \neq 0; D(f) = \mathbb{R} \setminus \{7\}]$  ]
- (c) **B**  $f(x) = \frac{6}{\log_3(x + 5)}$   $[x + 5 \geq 0; \log_3(x + 5) \neq 0; D(f) = ] - 5; \infty[\setminus\{-4\}]$  ]
- (d) **B**  $f(x) = \frac{\sqrt{x}}{x^2 - 5x + 6}$   $[x \geq 0; x^2 - 5x + 6 \neq 0; D(f) = [0; \infty[\setminus\{2; 3\}]$  ]
- (e) **B**  $f(x) = -\frac{\ln(3x - 2)}{4x + 7}$   $[3x - 2 > 0; 4x + 7 \neq 0; D(f) = ]\frac{2}{3}; \infty[$  ]
- (f) **B**  $f(x) = \ln(3 - 2x - x^2)$   $[3 - 2x - x^2 > 0; D(f) = ] - 3; 1[$  ]
- (g) **B**  $f(x) = \frac{\sqrt{7 + 4x}}{3x - 12}$   $[7 + 4x \geq 0; 3x - 12 \neq 0; D(f) = [-\frac{7}{4}; \infty[\setminus\{4\}]$  ]
- (h) **B**  $f(x) = \frac{\lg(11 - 4x)}{8x - 3}$   $[11 - 4x > 0; 8x - 3 \neq 0; D(f) = ] - \infty; \frac{11}{4}[\setminus\{\frac{3}{8}\}]$  ]
- (i) **B**  $f(x) = \frac{5}{4 - \sqrt{5x + 3}}$   $[5x + 3 \geq 0; 4 - \sqrt{5x + 3} \neq 0; D(f) = [-\frac{3}{5}; \infty[\setminus\{\frac{13}{5}\}]$  ]

- (j) **B**  $f(x) = \ln(10 - 2x)\sqrt{4x - 5}$   $[10 - 2x > 0; 4x - 5 \geq 0; D(f) = [\frac{5}{4}; 5[ ]$
- (k) **B**  $f(x) = \log_7(-5x + 7) + \sqrt{3x}$   $[-5x + 7 > 0; 3x \geq 0; D(f) = [0; \frac{7}{5}[ ]$
- (l) **B**  $f(x) = \frac{\log_6(5x + 8)}{\sqrt[5]{3x - 5}}$   $[5x + 8 \geq 0; 3x - 5 \neq 0; D(f) = ] - \frac{8}{5}; \infty[\setminus\{\frac{5}{3}\} ]$
- (m) **B**  $f(x) = \frac{-3x + 8}{\sqrt[6]{x^2 - 6x - 7}}$   
 $[\sqrt[6]{x^2 - 6x - 7} \neq 0; x^2 - 6x - 7 \geq 0; D(f) = ] - \infty; -1[\cup]7; \infty[ ]$
- (n) **B**  $f(x) = \frac{4x - 7}{\ln(3x - 6)}$   $[3x - 6 \geq 0; \ln(3x - 6) \neq 0; D(f) = ]2; \infty[\setminus\{\frac{7}{3}\} ]$

8. Határozza meg a valós számok legbővebb részhalmazát, melyen az adott függvény értelmezhető!

- (a) **V**  $f(x) = \frac{x}{\sqrt[4]{x^2 - 9} - 4}$   
 $[x^2 - 9 \geq 0; \sqrt[4]{x^2 - 9} - 2 \neq 0; D(f) = ] - \infty; -3[\cup]3; \infty[\setminus\{-5; 5\} ]$
- (b) **V**  $f(x) = \sqrt{\frac{4x - 5}{-1 + 3x}}$   $[\frac{4x - 5}{1 - 3x} \geq 0; D(f) = ]\frac{1}{3}; \frac{5}{4}[ ]$
- (c) **V**  $f(x) = \sqrt{\log_2 x + 5}$   
 $[\log_2 x + 5 \geq 0(\log_2 x - \text{szigorúan monoton növekvő}); x > 0; D(f) = [2^{-5}; \infty] = [\frac{1}{32}; \infty] ]$
- (d) **V**  $f(x) = \sqrt[6]{\log_{0,4} x + 2}$   
 $[\log_{0,4} x + 2 \geq 0(\log_{0,4} x - \text{szigorúan monoton csökkenő}); x > 0;$   
 $D(f) = ]0; 0, 4^{-2}] = ]0; 6, 25] ]$
- (e) **V**  $f(x) = \frac{2}{4 - \sqrt{x^2 + 7}}$   $[x^2 + 7 \geq 0; 4 - \sqrt{x^2 + 7} \neq 0; D(f) = \mathbb{R} \setminus \{-3; +3\} ]$
- (f) **V**  $f(x) = \frac{-7}{5 - \sqrt{x^2 - 9}}$   
 $[x^2 - 9 \geq 0; 5 - \sqrt{x^2 - 9} \neq 0; D(f) = ] - \infty; -3] \cup [3; \infty[\setminus\{-\sqrt{34}; \sqrt{34}\} ]$
- (g) **V**  $f(x) = \frac{4}{\ln(5x) + 3}$   
 $[5x > 0; \ln(5x) + 3 \neq 0; D(f) = ]0; \infty[\setminus\{\frac{e^{-3}}{5}\} = ]0; \infty[\setminus\{\frac{1}{5e^3}\} ]$
- (h) **V**  $f(x) = \sqrt{3^x - 81}$   
 $[3^x - 81 \geq 0(3^x - \text{szigorúan monoton növekvő}); D(f) = [4; \infty[ ]$
- (i) **V**  $f(x) = \ln(x^2 - x)\sqrt{16 - 4x^2}$   
 $[x^2 - x > 0; 16 - 4x^2 \geq 0; D(f) = [-2; 0[\cup]1; 2] ]$
- (j) **V**  $f(x) = \frac{x}{\ln(x^2 + x - 12)}$   
 $[x^2 + x - 12 > 0; \ln(x^2 + x - 12) \neq 0; D(f) = ] - \infty; -4[\cup]3; \infty[\setminus\{3, 14\} ]$
- (k) **V**  $f(x) = \sqrt{\frac{2x - 4}{7 + x}}$   $[\frac{2x - 4}{7 + x} \geq 0; D(f) = ] - \infty; -7[\cup]2; \infty[ ]$

$$(k) \quad \mathbf{V} \quad f(x) = \frac{\ln(x^2 - 20)}{x - 6}$$

$$\left[ x^2 - 20 > 0; x - 6 \neq 0; D(f) = ] - \infty; -\sqrt{20}[\cup]\sqrt{20}; \infty[\setminus\{6\} \right]$$

9. Az alábbi  $f : R \rightarrow R$  függvényeknek létezik inverze. Határozza meg az inverz függvény hozzárendelési utasítását!

$$(a) \quad \mathbf{B} \quad f(x) = 4x - 7 \quad \left[ f^{-1}(x) = \frac{x+7}{4} \right]$$

$$(b) \quad \mathbf{B} \quad f(x) = \frac{x - 5}{4 - 2x} \quad \left[ f^{-1}(x) = \frac{4x+5}{1+2x} \right]$$

$$(c) \quad \mathbf{B} \quad f(x) = \frac{3x - 4}{x + 2} \quad \left[ f^{-1}(x) = \frac{2x+4}{3-x} \right]$$

$$(d) \quad \mathbf{B} \quad f(x) = 3(x + 4)^7 - 2 \quad \left[ f^{-1}(x) = \sqrt[7]{\frac{x+2}{3}} - 4 \right]$$

$$(e) \quad \mathbf{B} \quad f(x) = 6 - 5(x - 1)^5 \quad \left[ f^{-1}(x) = \sqrt[5]{\frac{x-6}{-5}} + 1 \right]$$

$$(f) \quad \mathbf{B} \quad f(x) = 5\sqrt[3]{x - 8} + 9 \quad \left[ f^{-1}(x) = \left(\frac{x-9}{5}\right)^3 + 8 \right]$$

$$(g) \quad \mathbf{B} \quad f(x) = -2\sqrt[4]{x + 3} - 7 \quad \left[ f^{-1}(x) = \left(\frac{x+7}{-2}\right)^5 - 3 \right]$$

$$(h) \quad \mathbf{B} \quad f(x) = 3e^{2x-7} + 5 \quad \left[ f^{-1}(x) = \frac{\ln\left(\frac{x-5}{3}\right)+7}{2} = \frac{1}{2} \ln\left(\frac{x-5}{3}\right) + \frac{7}{2} \right]$$

$$(i) \quad \mathbf{B} \quad f(x) = 8^{x+2} - 4 \quad \left[ f^{-1}(x) = \log_8(x + 4) - 2 \right]$$

$$(j) \quad \mathbf{B} \quad f(x) = 5^{2-\frac{x}{3}} - 1 \quad \left[ f^{-1}(x) = -3(\log_2(x + 1) - 2) \right]$$

$$(k) \quad \mathbf{B} \quad f(x) = \log_6(4x - 8) + 3 \quad \left[ f^{-1}(x) = \frac{6^{x-3}+8}{4} \right]$$

$$(l) \quad \mathbf{B} \quad f(x) = 5 \log_2(6 - 4x) + 2 \quad \left[ f^{-1}(x) = \frac{2^{\frac{x-2}{5}}-6}{-4} = -\frac{1}{4}2^{\frac{x-2}{5}} + \frac{3}{2} \right]$$

$$(m) \quad \mathbf{B} \quad f(x) = 4 \ln(3 + 2x) - 7 \quad \left[ f^{-1}(x) = \frac{e^{\frac{x+7}{4}}-3}{2} = \frac{1}{2}e^{\frac{x+7}{4}} - \frac{3}{2} \right]$$

10. Határozza meg a következő  $f : R \rightarrow R$  függvények legbővebb értelmezési tartományát és értékkészletét! Határozza meg az inverz függvényt és annak legbővebb értelmezési tartományát és értékkészletét !

$$(a) \quad \mathbf{V} \quad f(x) = \ln(2x + 5) - 8$$

$$[D(f) = ] - 2, 5; \infty[; R(f) = R; f^{-1}(x) = \frac{e^{x+8}-5}{2};$$

$$D(f^{-1}) = R; R(f^{-1}) = ]2, 5; \infty[ ]$$

$$(b) \quad \mathbf{V} \quad f(x) = 4\sqrt{6 - 2x} + 12$$

$$[D(f) = ] - \infty; 3]; R(f) = [12; \infty[; f^{-1}(x) = \frac{\left(\frac{x-12}{4}\right)^2-6}{-2} = -\frac{1}{2} \left(\frac{x-12}{4}\right)^2 + 3;$$

$$D(f^{-1}) = [12; \infty[; R(f^{-1}) = ] - \infty; 3] ]$$

$$(c) \quad \mathbf{V} \quad f(x) = e^{5x+3} - 4$$

$$[D(f) = R; R(f) = ] - 4; \infty[; f^{-1}(x) = \frac{\ln(x+4)-3}{5};$$

$$D(f^{-1}) = ] - 4; \infty[; R(f^{-1}) = R]$$

- (d) **V**  $f(x) = \frac{3x - 15}{4 + x}$   
 $[D(f) = R \setminus \{-4\}; R(f) = R \setminus \{3\}; f^{-1}(x) = \frac{-15-4x}{x-3};$   
 $D(f^{-1}) = R \setminus \{3\}; R(f^{-1}) = R \setminus \{-4\}]$
- (e) **V**  $f(x) = 3 - 2^{3x-5}$   
 $[D(f) = R; R(f) = ] - \infty; 3[; f^{-1}(x) = \frac{\log_2(3-x)+5}{3};$   
 $D(f^{-1}) = ] - \infty; 3[; R(f^{-1}) = R]$
- (f) **V**  $f(x) = 4(3x + 7)^5 + 6$   
 $[D(f) = R; R(f) = R; f^{-1}(x) = \frac{\sqrt[5]{\frac{x-6}{4}}-7}{3};$   
 $D(f^{-1}) = R; R(f^{-1}) = R]$
- (g) **V**  $f(x) = 4 \log_3(7x - 14) + 11$   
 $[D(f) = ]2; \infty[; R(f) = R; f^{-1}(x) = \frac{3^{\frac{x-11}{4}}+14}{7};$   
 $D(f^{-1}) = R; R(f^{-1}) = ]2; \infty[ ]$