



① a) $3x^4 - 1 = 242$
 $3x^4 = 243$
 $x^4 = 81$
 $x = -\sqrt[4]{81} \vee x = \sqrt[4]{81}$
 $x = -3 \vee x = 3$

b) $5(2x-1)^6 + 7 = 12$
 $5(2x-1)^6 = 5$
 $(2x-1)^6 = 1$
 $2x-1 = -\sqrt[6]{1} \vee 2x-1 = \sqrt[6]{1}$
 $2x-1 = -1 \vee 2x-1 = 1$
 $2x = 0 \vee 2x = 2$
 $x = 0 \vee x = 1$

c) $\sqrt{2x-1} = 4$
 $2x-1 = 16$
 $2x = 17$
 $x = 8\frac{1}{2}$ voldoet

d) $6 + 5\sqrt{3x-6} = 51$
 $5\sqrt{3x-6} = 45$
 $\sqrt{3x-6} = 9$
 $3x-6 = 81$
 $3x = 87$
 $x = 29$ voldoet

e) $\frac{3}{2x+1} = \frac{2}{x+3}$

$2(2x-1) = 3(x+3)$
 $4x-2 = 3x+9$
 $x = 11$ voldoet

f) $\frac{2x+4}{x-1} = x$
 $x(x-1) = 2x+4$
 $x^2 - x = 2x+4$
 $x^2 - 3x - 4 = 0$
 $(x-4)(x+1) = 0$
 $x = 4 \vee x = -1$
voldoet voldoet.

g) $2^{x+1} = 64$ of $2^{x+1} = 64$
 $2^{x+1} = 2^6$ ${}^2\log(2^{x+1}) = {}^2\log(64)$
 $x+1 = 6$ $x+1 = {}^2\log(2^6)$
 $x = 5$ $x+1 = 6$
 $x = 5$

h) $3 \cdot 5^{2x+1} = 75\sqrt{5}$
 $5^{2x+1} = 25\sqrt{5}$
 $5^{2x+1} = 5^2 \cdot 5^{\frac{1}{2}}$
 $5^{2x+1} = 5^{2\frac{1}{2}}$
 $2x+1 = 2\frac{1}{2}$
 $2x = 1\frac{1}{2}$
 $x = \frac{3}{4}$

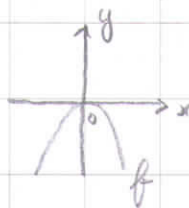
i) ${}^5\log(x) = {}^5\log(6) - 2 \cdot {}^5\log(4)$
 ${}^5\log(x) = {}^5\log(6) - {}^5\log(4^2)$
 ${}^5\log(x) = {}^5\log(6) - {}^5\log(16)$
 ${}^5\log(x) = {}^5\log(\frac{6}{16})$
 $x = \frac{6}{16} = \frac{3}{8}$ voldoet

j) ${}^3\log(x+x) = {}^3\log(x-1) = 2$
 ${}^3\log(\frac{x+x}{x-1}) = 2$
 $\frac{x+x}{x-1} = 3^2$
 $\frac{x+x}{x-1} = 9$
 $g(x-1) = x+x$
 $gx - g = x+x$
 $8x = 16$
 $x = 2$ voldoet

② a) $f(x) = -x^2$

$D_f = \langle \leftarrow, \rightarrow \rangle$

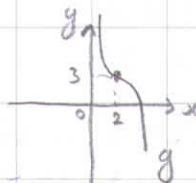
$B_f = \langle \leftarrow, 0 \rangle$, want sketch:



b) $g(x) = (2-x)^5 + 3$

$D_g = \langle \leftarrow, \rightarrow \rangle$

$B_g = \langle \leftarrow, \rightarrow \rangle$, want sketch



d) $i(x) = -0,1 \sqrt{8-4x} - 2$

~~8-4x~~ $8-4x \geq 0$

$-4x \geq -8$

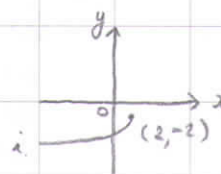
$x \leq 2$, dus $D_i = \langle \leftarrow, 2 \rangle$

~~8-4x~~ $8-4x = 0$

$-4x = -8$

$x = 2$

$i(2) = -2 \rightarrow$ samen met sketch: $B_i = \langle \leftarrow, -2 \rangle$



c & d
omgewisseld...

c) $h(x) = \sqrt{x+1}$

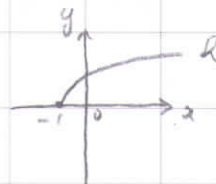
$x+1 \geq 0$

$x \geq -1$, dus $D_h = [-1, \rightarrow \rangle$

$x+1 = 0$

$x = -1$

$h(-1) = 0 \rightarrow$ samen met sketch: $B_h = [0, \rightarrow \rangle$



e) $j(x) = \frac{1}{x-6}$

$x-6 \neq 0$

$x \neq 6$, dus $D_j = \langle \leftarrow, 6 \rangle \cup \langle 6, \rightarrow \rangle$ (verticale asymptoot: $x=6$)

$j(1 \text{ mln}) \approx 0$ (horizontale asymptoot: $y=0$), dus $B_j = \langle \leftarrow, 0 \rangle \cup \langle 0, \rightarrow \rangle$



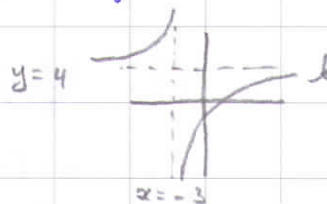
f) $k(x) = \frac{8x-4}{2x+6}$

$2x+6 \neq 0$

$2x \neq -6$

$x \neq -3$, dus $D_k = \langle \leftarrow, -3 \rangle \cup \langle -3, \rightarrow \rangle$ (verticale asymptoot: $x=-3$)

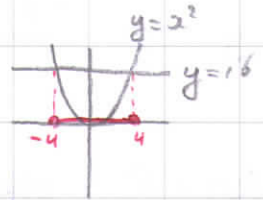
$k(1 \text{ mln}) \approx \frac{8}{2} = 4$ (horizontale asymptoot: $y=4$), dus $B_k = \langle \leftarrow, 4 \rangle \cup \langle 4, \rightarrow \rangle$





③ a) $x^2 \leq 16$
I HV $x^2 = 16$
 $x = -4 \vee x = 4$

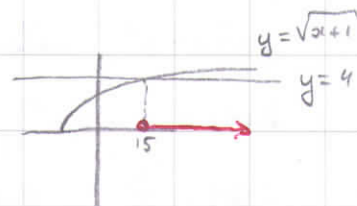
II schets



III conclusie
 $-4 \leq x \leq 4$

b) $\sqrt{x+1} > 4$
I HV $\sqrt{x+1} = 4$
 $x+1 = 16$
 $x = 15$ voldoet

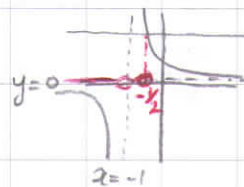
II schets



III conclusie
 $x > 15$

c) $\frac{1}{x+1} < 2$
I HV $\frac{1}{x+1} = 2$
 $2(x+1) = 1$
 $2x+2 = 1$
 $2x = -1$
 $x = -\frac{1}{2}$

II schets

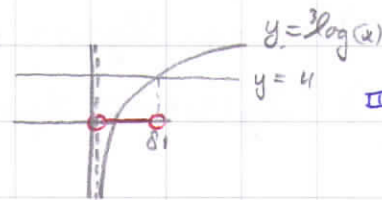


III conclusie

$x < -1 \vee -1 < x < -\frac{1}{2}$
↑ ↑
wegen asymptoot

d) $\sqrt[3]{\log(x)} < 4$
I HV $\sqrt[3]{\log(x)} = 4$
 $x = 3^4 = 81$
voldoet

II schets



III conclusie
 $0 < x < 81$

④ a) $f(x) = -3(x-5)^2 + 8$
bergparabool, max. bij (5, 8)

b) $g(x) = 5x^2 + 7$
herschrijven: $g(x) = 5(x-0)^2 + 7$
dalparabool, min. bij (0, 7)

c) $h(x) = -5(x+3)^6 + 2$
max. bij (-3, 2)

d) $k(x) = -8(x-1)^3$
geen extreme waarde, wel punt van symmetrie bij (1, 0)

e) $l(x) = x^2 + 4x$
 $x_{\text{top}} = -\frac{b}{2a} = -\frac{4}{2 \cdot 1} = -2$, $y_{\text{top}} = (-2)^2 + 4 \cdot -2 = -4$, min. bij (-2, -4)

⑤ a) $y = 5x^6 \xrightarrow{t(8,-3)} y = 5(x-8)^6 - 3$
 b) $y = -x^3 \xrightarrow{t(6,5)} y = -(x-6)^3 + 5$
 c) $y = 3\sqrt{2x} \xrightarrow{t(4,-6)} y = 3\sqrt{2(x-4)} - 6$
 d) $y = \frac{1}{x} \xrightarrow{t(-2,4)} y = \frac{1}{x+2} + 4$

⑥ a) $f(x) = 2^x$, alleen H.A. bij $y=0$
 b) $g(x) = -3^x$, alleen H.A. bij $y=0$
 c) $h(x) = 4 + 0,5^x$, alleen H.A. bij $y=4$
 d) $i(x) = \frac{1}{x}$, H.A. bij $y=0$ en V.A. bij $x=0$
 e) $j(x) = 120 - \frac{4}{x+70}$, H.A. bij $y=120$ en V.A. $x=-70$
 f) $k(x) = \frac{10x+3}{5x-4}$, H.A. bij $y=2$ en V.A. bij $x=\frac{4}{5}$

⑦ a) ${}^2\log(7) + {}^2\log(6) = {}^2\log(7 \cdot 6) = {}^2\log(42)$
 b) $2 - 4 \cdot {}^3\log(a) = {}^3\log(3^2) - {}^3\log(a^4) = {}^3\log(9) - {}^3\log(a^4) = {}^3\log\left(\frac{9}{a^4}\right)$
 c) ${}^3\log(50) - 2 \cdot {}^3\log(5) = {}^3\log(50) - {}^3\log(5^4) = {}^3\log(50) - {}^3\log(25) = {}^3\log\left(\frac{50}{25}\right) = {}^3\log(2)$

⑧ a) $y = \left(\frac{1}{3}x^2\right)^{-1} \cdot x^4 = \left(\frac{1}{3}\right)^{-1} \cdot (x^2)^{-1} \cdot x^4 = 3 \cdot x^{-2} \cdot x^4 = 3x^2$
 b) $y = 75 \cdot (5x)^{-2} \cdot 3x^{12} = 75 \cdot (5^{-2})(x^{-2}) \cdot 3x^{12} = 75 \cdot \frac{1}{25} \cdot 3 \cdot x^{-2} \cdot x^{12} = 9x^{10}$
 c) $y = 50 \cdot 2^{3x-1} = 50 \cdot 2^{3x} \cdot 2^{-1} = 50 \cdot (2^3)^x \cdot \frac{1}{2} = 25 \cdot 8^x$
 d) $y = 275 \cdot 5^{-2x} = 275 \cdot (5^{-2})^x = 275 \cdot \left(\frac{1}{25}\right)^x$

⑨ a) $N = 280 \cdot 1,7^t$
 $\log(N) = \log(280 \cdot 1,7^t)$
 $\log(N) = \log(280) + \log(1,7^t)$
 $\log(N) = \boxed{\log(280)} + t \cdot \boxed{\log(1,7)}$
 b) $N = 20 \cdot 0,4^{3t-2}$
 $\log(N) = \log(20 \cdot 0,4^{3t-2})$
 $\log(N) = \log(20) + \log(0,4^{3t-2})$
 $\log(N) = \log(20) + (3t-2) \log(0,4)$
 $\log(N) = \log(20) + 3 \log(0,4)t - 2 \log(0,4)$
 $\log(N) = \boxed{\log(20) - 2 \log(0,4)} + \boxed{3 \log(0,4)}t$

⑩ a) $\log(y) = 1,3 - 0,6x$
 $y = 10^{1,3-0,6x}$
 $y = 10^{1,3} \cdot (10^{-0,6})^x$
 $y \approx 20 \cdot 0,251^x$
 b) ${}^3\log 3 \cdot {}^3\log(y) = 8 - 4x$
 ${}^3\log(y) = \frac{8}{3} - \frac{4}{3}x$
 $y = 2^{8/3 - 4/3x}$
 $y = 2^{8/3} \cdot (2^{-4/3})^x$
 $y \approx 6 \cdot 0,397^x$