

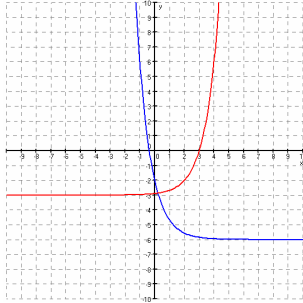
5.5 Diagnostische toets hoofdstuk 5

Opgave 1:

a. $f: T(2, -3)$

$g: V_{x-as,4}; T(0, -6)$

b.



c. $B_f = \langle -3, \rightarrow \rangle$

$B_g = \langle -6, \rightarrow \rangle$

d. $y_1 = 3^{x-2} - 3$ en $y_2 = 4 \cdot \left(\frac{1}{3}\right)^x - 6$
de optie intersect geeft $x = 0,22$
dus $x \geq 0,22$

e. $4 \cdot \left(\frac{1}{3}\right)^x - 6 \leq 6$

$$4 \cdot \left(\frac{1}{3}\right)^x = 12$$

$$\left(\frac{1}{3}\right)^x = 3$$

$$(3^{-1})^x = 3$$

$$3^{-x} = 3^1$$

$$-x = 1$$

$$x \geq -1$$

f. $f(4) = 3^2 - 3 = 6$

$$-3 < f(x) \leq 6$$

Opgave 2:

a. $5^{x-1} = 125 \cdot \sqrt[3]{5}$

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

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

$$x-1 = 3\frac{1}{3}$$

$$x = 4\frac{1}{3}$$

b. $3^{2x-5} = \frac{1}{27} \sqrt{3}$

$$3^{2x-5} = \frac{1}{3^3} \cdot 3^{\frac{1}{2}}$$

$$3^{2x-5} = 3^{-3} \cdot 3^{\frac{1}{2}}$$

$$3^{2x-5} = 3^{-2\frac{1}{2}}$$

$$2x-5 = -2\frac{1}{2}$$

$$2x = 2\frac{1}{2}$$

$$x = 1\frac{1}{4}$$

c. $2 \cdot 4^{2x-1} - 3 = 61$

$$2 \cdot 4^{2x-1} = 64$$

$$4^{2x-1} = 32$$

$$(2^2)^{2x-1} = 2^5$$

$$2^{4x-2} = 2^5$$

$$4x - 2 = 5$$

$$4x = 7$$

$$x = 1\frac{3}{4}$$

d. $(\frac{1}{2})^{3x+1} + 6 = 6\frac{1}{8}$

$$(\frac{1}{2})^{3x+1} = \frac{1}{8}$$

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

$$3x + 1 = 3$$

$$3x = 2$$

$$x = \frac{2}{3}$$

Opgave 3:

a. $9^{x-1} = 27^{x+1}$

$$(3^2)^{x-1} = (3^3)^{x+1}$$

$$3^{2x-2} = 3^{3x+3}$$

$$2x - 2 = 3x + 3$$

$$-x = 5$$

$$x = -5$$

b. $2^{x+2} + 2^{x-1} = 36$

$$2^2 \cdot 2^x + 2^{-1} \cdot 2^x = 36$$

$$4 \cdot 2^x + \frac{1}{2} \cdot 2^x = 36$$

$$4\frac{1}{2} \cdot 2^x = 36$$

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

c. $3^{x+1} = 3^x + 54$

$$3 \cdot 3^x - 3^x = 54$$

$$2 \cdot 3^x = 54$$

$$3^x = 27$$

$$3^x = 3^3$$

$$x = 3$$

d. $2^{x^2} = (\frac{1}{8})^x$

$$2^{x^2} = (\frac{1}{2^3})^x$$

$$2^{x^2} = (2^{-3})^x$$

$$2^{x^2} = 2^{-3x}$$

$$x^2 = -3x$$

$$x^2 + 3x = 0$$

$$x(x + 3) = 0$$

$$x = 0 \quad \vee \quad x = -3$$

Opgave 4:

a. $H = 20 \cdot 1,07^t$

b. $20 \cdot 1,07^t = 55$

$$1,07^t = 2,75$$

$$t = \frac{\log 2,75}{\log 1,07} = 14,95 \text{ dus op 15 mei}$$

c. $y_1 = 20 \cdot 1,07^t$

kijk in de tabel, dat is van $t = 19$ naar $t = 20$, dus op 20 mei.

Opgave 5:

a. $g_{\text{dag}} = 1,1$

$$g_{\text{week}} = 1,1^7 = 1,949 \text{ dus met } 94,9\%$$

b. $g_{8 \text{ uur}} = 1,1^{\frac{1}{3}} = 1,032 \text{ dus met } 3,2\%$

Opgave 6:

a. $g_{\text{jaar}} = 0,64$

$$g_{\text{maand}} = 0,64^{\frac{1}{12}} = 0,963 \text{ dus met } 3,7\%$$

b. $g_{5 \text{ jaar}} = 0,64^5 = 0,107 \text{ dus met } 89,3\%$

Opgave 7:

$$g^3 = \frac{1200}{1500} = 0,8$$

$$g = \sqrt[3]{0,8} = 0,928$$

$$b = \frac{1500}{0,928^4} = 2023$$

$$N = 2023 \cdot 0,928^t$$

Opgave 8:

a. ${}^3 \log 3\sqrt{3} = {}^3 \log 3^{1\frac{1}{2}} = 1\frac{1}{2}$

b. ${}^2 \log_{\frac{1}{16}} \sqrt[3]{2} = {}^2 \log_{\frac{1}{2^4}} 2^{\frac{1}{3}} = {}^2 \log 2^{-4} \cdot 2^{\frac{1}{3}} = {}^2 \log 2^{-\frac{12}{3}} = {}^2 \log 2^{-3\frac{2}{3}} = -3\frac{2}{3}$

c. $\frac{1}{3} \log\left(\frac{1}{3}\right)^{0,6} = 0,6$

d. ${}^2 \log_{\frac{1}{4}} \sqrt{8} = {}^2 \log_{\frac{1}{2^2}} \sqrt{2^3} = {}^2 \log 2^{-2} \cdot 2^{\frac{3}{2}} = {}^2 \log 2^{-\frac{4}{2}} = -\frac{1}{2}$

Opgave 9:

a. ${}^4 \log(2x - 3) = 2$

$$2x - 3 = 4^2$$

$$2x - 3 = 16$$

$$2x = 19$$

$$x = 9\frac{1}{2}$$

b. $3 + {}^3 \log x = 7$

$${}^3 \log x = 4$$

$$x = 3^4 = 81$$

c. $\frac{1}{2} \log(x-3) = -4$

$$x-3 = \left(\frac{1}{2}\right)^{-4}$$

$$x-3 = 16$$

$$x = 19$$

d. $5 + 3 \cdot 2 \log x = 20$

$$3 \cdot 2 \log x = 15$$

$$2 \log x = 5$$

$$x = 2^5 = 32$$

Opgave 10:

a. $5 \cdot 2 \log 20 = 5 \cdot \frac{\log 20}{\log 2} = 21,61$

b. $\frac{6}{{}^3 \log 30} = \frac{6}{\frac{\log 30}{\log 3}} = 1,94$

Opgave 11:

a. $2x + 5 > 0$

$$2x > -5$$

$$x > -2\frac{1}{2}$$

$$D_f = \langle -2\frac{1}{2}, \rightarrow \rangle$$

$$\text{V.A.: } x = -2\frac{1}{2}$$

b. $3 - 2 \log(2x+5) = -2$

$$-2 \log(2x+5) = -5$$

$$2 \log(2x+5) = 5$$

$$2x+5 = 2^5$$

$$2x+5 = 32$$

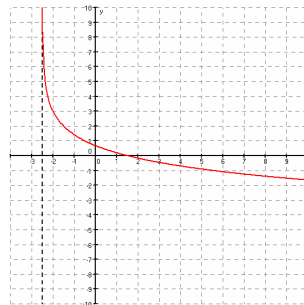
$$2x = 27$$

$$x = 13\frac{1}{2}$$

$$-2\frac{1}{2} < x \leq 13\frac{1}{2}$$

c. $f(5\frac{1}{2}) = 3 - 2 \log 16 = 3 - 4 = -1$

$$f(x) \geq -1$$



Opgave 12:

a. $f: x+1 > 0$

$$x > -1$$

$$D_f = \langle -1, \rightarrow \rangle$$

$$\text{V.A.: } x = -1$$

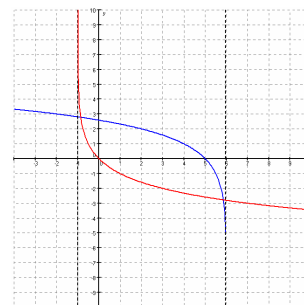
g: $-x+6 > 0$

$$-x > -6$$

$$x < 6$$

$$D_g = \langle \leftarrow, 6 \rangle$$

$$\text{V.A.: } x = 6$$



b. $\frac{1}{2} \log(x+1) = 4$

$$x+1 = \left(\frac{1}{2}\right)^4$$

$$x+1 = \frac{1}{16}$$

$$x = -\frac{15}{16}$$

- c. $g(-2) = 2 \log 8 = 3$
 $g(x) \leq 3$
- d. $\frac{1}{2} \log(x+1) = -2$ $\frac{1}{2} \log(x+1) = 2$
 $x+1 = \left(\frac{1}{2}\right)^{-2}$ $x+1 = \left(\frac{1}{2}\right)^2$
 $x+1 = 4$ $x+1 = \frac{1}{4}$
 $x = 3$ $x = -\frac{3}{4}$
 $-\frac{3}{4} \leq x \leq 3$
- e. $y_1 = \log(x+1)/\log(0.5)$ en $y_2 = \log(-x+6)/\log(2)$
intersect geeft $x = -0,85 \vee x = 5,85$
 $-0,85 \leq x \leq 5,85$
- f. $\frac{1}{2} \log(x+1) = 1$ $2 \log(-x+6) = 1$
 $x+1 = \left(\frac{1}{2}\right)^1$ $-x+6 = 2^1$
 $x = -\frac{1}{2}$ $-x = -4$
 $x = 4$
 $AB = 4 - -\frac{1}{2} = 4\frac{1}{2}$

Opgave 13:

$$10 \cdot \log \frac{I_1}{10^{-12}} = 78$$

$$\log \frac{I_1}{10^{-12}} = 7,8$$

$$\frac{I_1}{10^{-12}} = 10^{7,8}$$

$$I_1 = 10^{-4,2}$$

$$\log \frac{I_2}{10^{-12}} = 8$$

$$\frac{I_2}{10^{-12}} = 10^8$$

$$I_2 = 10^{-4}$$

$$\log \frac{I_3}{10^{-12}} = 8,1$$

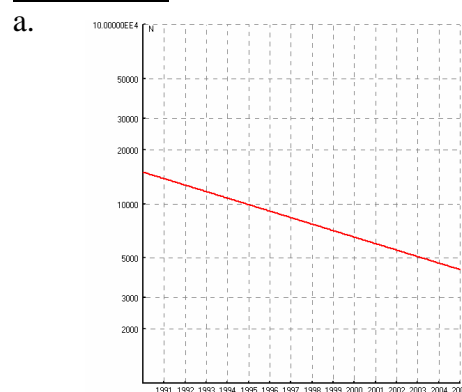
$$\frac{I_3}{10^{-12}} = 10^{8,1}$$

$$I_3 = 10^{-3,9}$$

$$I_{tot} = I_1 + I_2 + I_3 = 10^{-4,2} + 10^{-4} + 10^{-3,9} = 2,89 \cdot 10^{-4}$$

$$L = 10 \cdot \log \frac{2,89 \cdot 10^{-4}}{10^{-12}} = 84,6 \text{ dB}$$

Opgave 14:



- b. $g^{15} = \frac{4300}{15000} = 0,287$
 $g = \sqrt[15]{0,287} = 0,920$
 $N = 15000 \cdot 0,920^t$

Opgave 15:

a. $t = 1 \quad N = 300$

$t = 3 \quad N = 500$

$g^2 = \frac{500}{300} = 1,67$

$g = \sqrt{1,67} = 1,29$

$b = \frac{300}{1,29} = 233$

$N = 233 \cdot 1,29^t$

b. $t = 1 \quad N = 700$

$t = 3 \quad N = 400$

$g^2 = \frac{400}{700} = 0,57$

$g = \sqrt{0,57} = 0,76$

$b = \frac{700}{0,76} = 926$

$N = 926 \cdot 0,76^t$

Opgave 16:

a. $g_{\text{maand}} = 1,002$

$1,002^t = 2$

$t = \frac{\log 2}{\log 1,002} = 347 \text{ maanden , dus 29 jaar}$

b. $g_{\text{week}} = 0,8$

$0,8^t = \frac{1}{2}$

$t = \frac{\log \frac{1}{2}}{\log 0,8} = 3,1 \text{ week , dus 22 dagen}$

Opgave 17:

$g^{32} = \frac{1}{2}$

$g = \sqrt[32]{\frac{1}{2}} = 0,979$

2,1% afname