

HAVO WISKUNDE B 2019 TIJDVAK 2

Opgave 1:

$$4^{x+1} - 3 = 13$$

$$4^{x+1} = 16 = 4^2$$

$$x + 1 = 2$$

$$x = 1$$

$$8 + {}^2\log\left(4\left(x + 1\frac{1}{2}\right)\right) = 13$$

$${}^2\log\left(4\left(x + 1\frac{1}{2}\right)\right) = 5$$

$$4\left(x + 1\frac{1}{2}\right) = 2^5 = 32$$

$$x + 1\frac{1}{2} = 8$$

$$x = 6\frac{1}{2}$$

$$AB = 6\frac{1}{2} - 1 = 5\frac{1}{2}$$

Opgave 2:

$$g(x) = 8 + {}^2\log(4\left(x + 1\frac{1}{2}\right))$$

$$= 8 + {}^2\log(4) + {}^2\log(x + 1\frac{1}{2})$$

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

$$= 10 + {}^2\log(x + 1\frac{1}{2})1+0,5C$$

dus de translatie $(-1\frac{1}{2}, 10)$

Opgave 3:

$$8^2 = 11^2 + 5^2 - 2 \cdot 11 \cdot 5 \cdot \cos \angle A$$

$$64 = 121 + 25 - 110 \cos \angle A$$

$$110 \cos \angle A = 82$$

$$\cos \angle A = \frac{82}{110}$$

$$\angle A = 41,8^\circ$$

$$\cos 41,8^\circ = \frac{AD}{5}$$

$$AD = 5 \cdot \cos 41,8^\circ = 3,727$$

$$\triangle ADE \sim \triangle ABC$$

$$\frac{AD}{AB} = \frac{DE}{BC}$$

$$\frac{3,727}{11} = \frac{DE}{8}$$

$$DE = \frac{8 \cdot 3,727}{11} = 2,71$$

Opgave 4:

$$V(0,17) = 2,286$$

$$\frac{1+0,5C}{(1-c)^4} = 4,572$$

$$Y_1 = \frac{1+0,5x}{(1-x)^4} \text{ en } Y_2 = 4,572 \text{ intsect geeft } x = 0,29$$

$$\text{dus } C = 0,29$$

Opgave 5:

$$a = V'(0) = \frac{V(0,001) - V(0)}{0,001} = \frac{1,0045 - 1}{0,001} = 4,5$$

$$b = V(0) = 1$$

$$V_{lin} = 4,5C + 1$$

Opgave 6:

$$f(x) = -(2x - 3)^3 + 3x^2 - 6x + 4$$

$$\begin{aligned} f'(x) &= -3(2x - 3)^2 \cdot 2 + 6x - 6 \\ &= -6(4x^2 - 12x + 9) + 6x - 6 \\ &= -24x^2 + 72x - 54 + 6x - 6 \\ &= -24x^2 + 78x - 60 \end{aligned}$$

Opgave 7:

$$f'(x) = -24x^2 + 78x - 60 = 0$$

$$x = \frac{-78 \pm \sqrt{324}}{-48} = \frac{-78 \pm 18}{-48}$$

$$x = 1\frac{1}{4} \quad \vee \quad x = 2$$

$$A(1\frac{1}{4}, 1\frac{5}{16}) \text{ en } B(2,3)$$

$$rc_k = \frac{3 - 1\frac{5}{16}}{2 - 1\frac{1}{4}} = 2\frac{1}{4}$$

$$k: y = 2\frac{1}{4}x + b \text{ door } (2, 3)$$

$$3 = 4\frac{1}{2} + b$$

$$b = -1\frac{1}{2}$$

$$k: y = 2\frac{1}{4}x - 1\frac{1}{2}$$

$$l: y = 2\frac{1}{4}x + b \text{ door } P(1,2)$$

$$2 = 2\frac{1}{4} + b$$

$$b = -\frac{1}{4}$$

$$y = 2\frac{1}{4}x - \frac{1}{4}$$

$$z = \frac{OM}{ON} = \frac{1\frac{1}{2}}{\frac{1}{2}} = 6$$

Opgave 8:

$$v = \frac{60}{22,5} \cdot 8,5 = 22\frac{2}{3} \text{ km/uur}$$

$$P = 0,00386 \cdot 22\frac{2}{3} \cdot \left(22\frac{2}{3} + 80\right)^2 = 922,2 \text{ W}$$

$$5\% \text{ meer tegenwind: } P = 0,00386 \cdot 22\frac{2}{3} \cdot \left(22\frac{2}{3} + 80 \cdot 1,05\right)^2 = 955,5 \text{ W}$$

$$\frac{955,5 - 922,2}{922,2} \cdot 100\% = 7,9\% \text{ dus } 8\%$$

Opgave 9:

$$0,0273 \cdot 72 \cdot 5,9 \cdot v = 210$$

$$11,59704v = 210$$

$$v = 18,1 \text{ km/uur}$$

$$\frac{1,2}{18,1} \cdot 60 = 3,98 \text{ dus } 4 \text{ minuten}$$

Opgave 10:

$$P_{\text{bergop}} = 0,0273 \cdot 78 \cdot 8,4 \cdot 19 = 339,85224$$

$$0,00386v(v + 70)^2 = 339,85224$$

$$Y_1 = 0,00386x(x + 70)^2 \text{ en } Y_2 = 339,85224 \text{ intsect geeft } x = 12,8$$

dus $v = 12,8 \text{ km/uur}$

Opgave 11:

$$f(x) = 1 + 4\sqrt{x}$$

$$f'(x) = 4 \cdot \frac{1}{2\sqrt{x}} = \frac{2}{\sqrt{x}}$$

$$f'(4) = 1$$

$$l: y = x + b \text{ door } (4, 9)$$

$$9 = 4 + b$$

$$b = 5$$

$$y = x + 5$$

$$l \text{ en } c \text{ snijden: } (x + 2)^2 + (x + 5 + 1)^2 = 8$$

$$x^2 + 4x + 4 + x^2 + 12x + 36 = 8$$

$$2x^2 + 16x + 32 = 0$$

$$D = 16^2 - 4 \cdot 2 \cdot 32 = 0$$

dus l en c raken elkaar

Opgave 12:

$$4 + (y + 1)^2 = 8$$

$$(y + 1)^2 = 4$$

$$y + 1 = 2 \quad \vee \quad y + 1 = -2$$

$$y = 1 \quad \vee \quad y = -3$$

$$S = (0, -3)$$

$$g(0) = q = -3$$

$$g(4) = 2p - 3 = 9$$

$$2p = 12$$

$$p = 6$$

Opgave 13:

$$-1 + \sin\left(2x - \frac{1}{6}\pi\right) = -\frac{1}{2}$$

$$\sin\left(2x - \frac{1}{6}\pi\right) = \frac{1}{2}$$

$$2x - \frac{1}{6}\pi = \frac{1}{6}\pi + k \cdot 2\pi \quad \vee \quad 2x - \frac{1}{6}\pi = \frac{5}{6}\pi + k \cdot 2\pi$$

$$2x = \frac{1}{3}\pi + k \cdot 2\pi \quad \vee \quad 2x = \pi + k \cdot 2\pi$$

$$x = \frac{1}{6}\pi + k \cdot \pi \quad \vee \quad x = \frac{1}{2}\pi + k \cdot \pi$$

$$x = \frac{1}{6}\pi \quad \vee \quad x = 1\frac{1}{6}\pi \quad \vee \quad x = \frac{1}{2}\pi \quad \vee \quad x = 1\frac{1}{2}\pi$$

Opgave 14:

$$-1 + \sin\left(2x - \frac{1}{6}\pi\right) = 0$$

$$\sin\left(2x - \frac{1}{6}\pi\right) = 1$$

$$2x - \frac{1}{6}\pi = \frac{1}{2}\pi + k \cdot 2\pi$$

$$2x = \frac{2}{3}\pi + k \cdot 2\pi$$

$$x_A = \frac{1}{3}\pi$$

$$rc_l = \tan 75^\circ = 3,732$$

$$l: y = 3,732x + b \quad \text{door } \left(\frac{1}{3}\pi, 0\right)$$

$$0 = 3,908 + b$$

$$b = -3,908 \quad \text{dus } B = (0; -3,908)$$

$$AB = \sqrt{\left(\frac{1}{3}\pi\right)^2 + (-3,908)^2} = 4,05$$

Opgave 15:

periode van f is π dus de periode van g is $\frac{1}{3}\pi$

$$b = \frac{2\pi}{\frac{1}{3}\pi} = 6$$

amplitude van f is 1 dus de amplitude van g is $\frac{1}{4}$

$$f(0) = -1 + \sin\left(-\frac{1}{6}\pi\right) = -1\frac{1}{2}$$

$$d = -1\frac{1}{2} + \frac{1}{4} = -1\frac{1}{4}$$

de grafiek van g begint op zijn laagste punt in $(0, -1\frac{1}{2})$ dus $a = -\frac{1}{4}$

Opgave 16:

$$x_{top} = \frac{165}{2} = 82,5$$

$$y_{top} = 51,858$$

$$\begin{cases} a \cdot 165^2 + b \cdot 165 = 0 & \times 1 \\ a \cdot 82,5^2 + b \cdot 82,5 = 51,858 & \times 2 \end{cases}$$

$$\begin{cases} 27225a + 165b = 0 \\ 13612,5a + 165b = 103,716 \end{cases} -$$

$$13612,5a = -103,716$$
$$a = -0,0076$$
$$-207,432 + 165b = 0$$
$$165b = 207,432$$
$$b = 1,2572$$