

Wiskunde Gr.11 Junie Vraestel 1 (0001)

Tydsduur: 2H

Totaal:100 punte

Vraag 1: [14]

Los op vir x . Waar nodig, rond af tot 2 desimale:

1.1 $(x + 1)(2x - 1) = 0$ (2)

$$\begin{array}{l} x+1=0 \quad \text{of} \quad 2x-1=0 \\ x=-1 \checkmark \quad x=\frac{1}{2} \checkmark \end{array}$$

1.2 $(2x - 1)(x + 4) = -4$ (4)

$$\begin{array}{l} 2x^2 + 8x - x - 4 = -4 \\ 2x^2 + 7x - 4 + 4 = 0 \\ 2x^2 + 7x = 0 \\ x(2x + 7) = 0 \\ x=0 \checkmark \quad \text{of} \quad x=-\frac{7}{2} \checkmark \end{array}$$

1.3 $(x^2 - 2x)^2 = 9$ (6)

$$\begin{array}{l} x^2 - 2x = \pm 3 \\ x^2 - 2x = 3 \quad \text{of} \quad x^2 - 2x = -3 \\ x^2 - 2x - 3 = 0 \quad x^2 - 2x + 3 = 0 \\ (x-3)(x+1) = 0 \quad x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(3)}}{2(1)} \\ x=3 \checkmark \quad \text{of} \quad x=-1 \checkmark \quad x = \frac{2 \pm \sqrt{-8}}{2} \checkmark \\ \text{Geen R\checkmark-oplossing} \end{array}$$

1.4 $4x^2 + 9 = 0$ (2)

$$\begin{array}{l} 4x^2 = -9 \\ x^2 = -\frac{9}{4} \quad x = \pm \sqrt{-\frac{9}{4}} \\ \text{Geen R\checkmark-oplossing} \end{array}$$

Vraag 2: [7]

Los op vir y:

$$\frac{y}{y+1} + \frac{2y}{y-1} - \frac{y^2+3}{y^2-1} = \frac{9}{4}$$

$$\frac{y}{(y+1)} + \frac{2y}{(y-1)} - \frac{(y^2+3)}{(y-1)(y+1)} = \frac{9}{4}$$

$$\text{KGV} = 4(y+1)(y-1)$$

$$\therefore y \neq -1 \text{ of } y \neq 1$$

$$\therefore 4y(y-1) + 4 \times 2y(y+1) - 4(y^2+3) = 9(y-1)(y+1)$$

$$4y^2 - 4y + 8y^2 + 8y - 4y^2 - 12 = 9(y^2 - 1)$$

$$8y^2 + 4y - 12 = 9y^2 - 9$$

$$8y^2 + 4y - 12 - 9y^2 + 9 = 0$$

$$-y^2 + 4y - 3 = 0$$

$$y^2 - 4y + 3 = 0$$

$$(y-3)(y-1) = 0$$

$$y-3=0 \text{ of } y-1=0$$

$$y=3$$

$$y=1$$

NUT

Vraag 3: [10]

3.1 Los op vir k : $k^2 - k - 20 = 0$

(3)

$$(k-5)(k+4) = 0$$

$$k-5=0 \quad \text{of} \quad k+4=0$$

$$k=5 \quad \checkmark$$

$$k=-4 \quad \checkmark$$

3.2 Los nou op vir x met behulp van jou antwoorde in 3.1:

$$(x^2 + 4x)^2 - (x^2 + 4x) - 20 = 0$$

(7)

$$\text{Stel } x^2 + 4x = k \quad \checkmark$$

$$\therefore k^2 - k - 20 = 0$$

$$\text{maar } k=5 \quad \text{of} \quad \checkmark \quad k=-4 \quad [\text{Sien 3.1}]$$

$$\therefore x^2 + 4x = 5$$

$$x^2 + 4x = -4$$

$$x^2 + 4x - 5 = 0$$

$$x^2 + 4x + 4 = 0$$

$$(x+5)(x-1) = 0$$

$$(x+2)(x+2) = 0$$

$$x = -5 \quad \checkmark \quad \text{of} \quad \checkmark \quad x = 1$$

$$x = -2 \quad \text{of} \quad x = -2$$

Vraag 4: [8]

Los op vir x . Onthou om jou antwoorde te toets!

$$x + \sqrt{2x - 5} = 2$$

$$\sqrt{2x - 5} = 2 - x \quad \checkmark$$

$$(\sqrt{2x - 5})^2 = (2 - x)^2$$

$$2x - 5 = 4 - 4x + x^2$$

$$0 = x^2 - 4x + 4 - 2x + 5$$

$$0 = x^2 - 6x + 9$$

$$0 = (x - 3)(x - 3)$$

$$\therefore x = 3 \quad \checkmark$$

Toets: $LK = x + \sqrt{2x - 5}$

$$RK = 2$$

$$= 3 + \sqrt{2 \times 3 - 5}$$

$$= 3 + 1 = 4$$

$$\therefore LK \neq RK$$

$$\therefore x \neq 3$$

$\therefore$ Geen oplossing!

Vraag 5: [8]

Los op vir x en y :

$$x^2 + 2xy = 3y^2 - 7 \quad \text{en} \quad 3x - y = 1$$

$$3x - 1 \quad \checkmark = y$$

$$x^2 + 2x(3x - 1) = 3(3x - 1)^2 - 7$$

$$x^2 + 6x^2 - 2x = 3(9x^2 - 6x + 1) - 7$$

$$7x^2 - 2x = 27x^2 - 18x + 3 - 7$$

$$0 = 27x^2 - 18x - 4 - 7x^2 + 2x$$

$$0 = 20x^2 - 16x - 4$$

$$0 = 5x^2 - 4x - 1$$

$$0 = (5x + 1)(x - 1)$$

$$x = -\frac{1}{5} \quad \checkmark \quad \text{of} \quad x = 1 \quad \checkmark$$

$$\therefore y = 3\left(-\frac{1}{5}\right) - 1$$

$$y = -\frac{8}{5} \quad \checkmark$$

$$y = 3(1) - 1$$

$$y = 2 \quad \checkmark$$

Vraag 6: [15]

Geen sakrekenaar mag in hierdie vraag gebruik word nie!

6.1 Vereenvoudig: (a) $\frac{12^{x+1} \times 9^{x-2} \times 3^x}{18^{2x-1}}$ (5)

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

$$= \frac{2^{2x+2} \times 3^{x+1} \times 3^{2x-4} \times 3^x}{3^{4x-2} \times 2^{2x-1}}$$

$$= \frac{2^{2x+2} \times 3^{4x-3}}{2^{2x-1} \times 3^{4x-2}}$$

$$= 2^{2x+2-(2x-1)} \times 3^{4x-3-(4x-2)}$$

$$= 2^{2x+2-2x+1} \times 3^{4x-3-4x+2}$$

$$= 2^3 \cdot 3^{-1}$$

$$= \frac{8}{3}$$

(b) $\sqrt{27} - \sqrt{3} - \sqrt{12}$ (3)

$$= 3\sqrt{3} - 1\sqrt{3} - 2\sqrt{3}$$

$$= 0 \quad \checkmark$$

6.2 Los op vir x: (a) $2x^{\frac{3}{2}} = 54$ (3)

$$x^{\frac{3}{2}} = \frac{54}{2} \checkmark = 27$$

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

$$x^1 = 3^{-2}$$

$$x = \frac{1}{3^2} \checkmark = \frac{1}{9}$$

$$(b) \quad 2^{3x+1} + 2^{3x} = 12 \quad (4)$$

$$2^{3x} \cdot 2^1 + 2^{3x} = 12$$

$$2^{3x} (2 + 1) = 12$$

$$2^{3x} (3) = 12$$

$$2^{3x} = \frac{12}{3}$$

$$2^{3x} = 4$$

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

$$\therefore 3x = 2$$

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

Vraag 7:[10]

In 'n kwadratiese getalpatroon is die tweede verskil 2.

Die eerste twee terme van die ry is onderskeidelik 2 en 9.

7.1 Bepaal die n^{de} term van die ry.

(5)

$$2, 9, \dots$$

met 2^{de} verskil = 2

$$(*) \therefore 2a = 2 \checkmark$$

$$a = 1 \checkmark$$

$$(*) \quad 3a + b = 7$$

$$(*) \quad a + b + c = 2$$

$$3(1) + b = 7$$

$$1 + 4 + c = 2$$

$$b = 4 \checkmark$$

$$c = -3 \checkmark$$

$$\therefore T_n = n^2 + 4n - 3 \checkmark$$

7.2 Watter term in die ry sal gelyk wees aan 218?

(5)

$$T_n = n^2 + 4n - 3$$

$$218 = n^2 + 4n - 3$$

$$0 = n^2 + 4n - 3 - 218$$

$$0 = n^2 + 4n - 221 \checkmark$$

$$0 = (n+17)(n-13)$$

$$n = -17 \checkmark \text{ of } n = 13 \checkmark$$

NUT $\checkmark$

Vraag 8:[7]

8.1 Skets die volgende grafieke op dieselfde assstelsel:

(6)

$$p(x) = \frac{-4}{x+2} + 1$$

en

$$t(x) = 2$$

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

$$y = 2$$

* Vorm: $a < 0$ 

* Asimpt: $x = -2$ $y = 1$

* x-afs: $0 = \frac{-4}{x+2} + 1$

($y=0$) $\frac{4}{x+2} = 1$

$$4 = x+2$$

$$2 = x \checkmark$$

$$\therefore (2; 0)$$

* y-afsnit: ($x=0$)

$$y = \frac{-4}{0+2} + 1$$

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

$$\therefore (0; -1) \checkmark$$

8.2 Bereken die koördinate van $p \cap t$. $\rightarrow y=2$

(1)

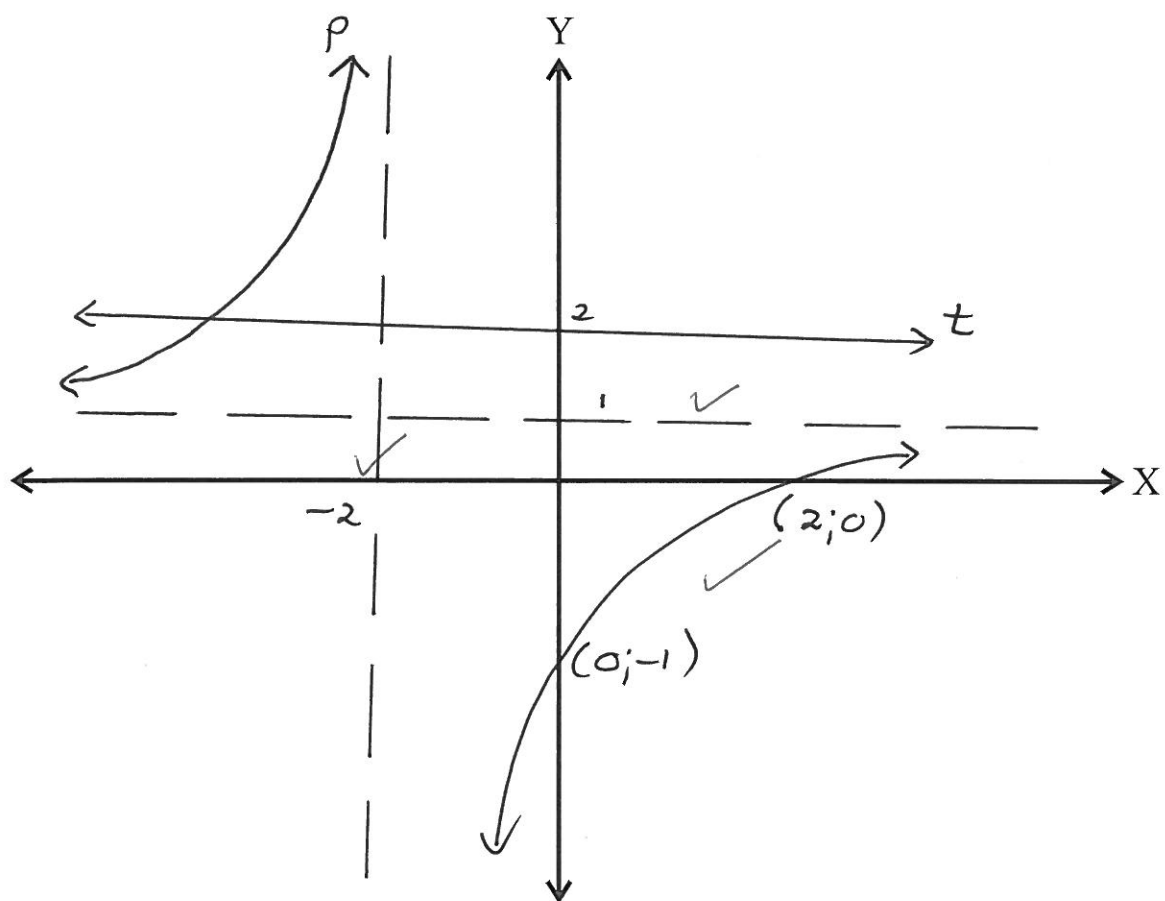
$$p(x) = \frac{-4}{x+2} + 1 = 2$$

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

$$-4 = x+2$$

$$x = -6$$

$$\therefore (-6; 2) \checkmark$$



Vraag 9: [8]

9.1 Bepaal die aard van die wortels, sonder om die vergelyking op te los:

$$4x^2 + 2(x - 1) = 3 \quad (4)$$

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

$$4x^2 + 2x - 2 - 3 = 0$$

$$4x^2 + 2x - 5 = 0$$

$$\Delta = b^2 - 4ac$$

$$= (2)^2 - 4(4)(-5)$$

$$\Delta = 84 \quad \checkmark$$

$\therefore$ Wortels is reëel; ongelijk en irrasionaal

9.2 Bepaal die waarde(s) van k as $kx^2 + 2x - 3 = 0$
nie-reële wortels het.

(4)

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

$$a = k \quad b = 2 \quad c = -3$$

$$\Delta = b^2 - 4ac$$

$$= (2)^2 - 4(k)(-3)$$

$$\Delta = 4 + 12k \quad \checkmark$$

Nie-reële wortels $\Rightarrow \Delta < 0$

$$\therefore 4 + 12k < 0 \quad \checkmark$$

$$12k < -4$$

$$k < -\frac{4}{12}$$

$$k < -\frac{1}{3} \quad \checkmark$$

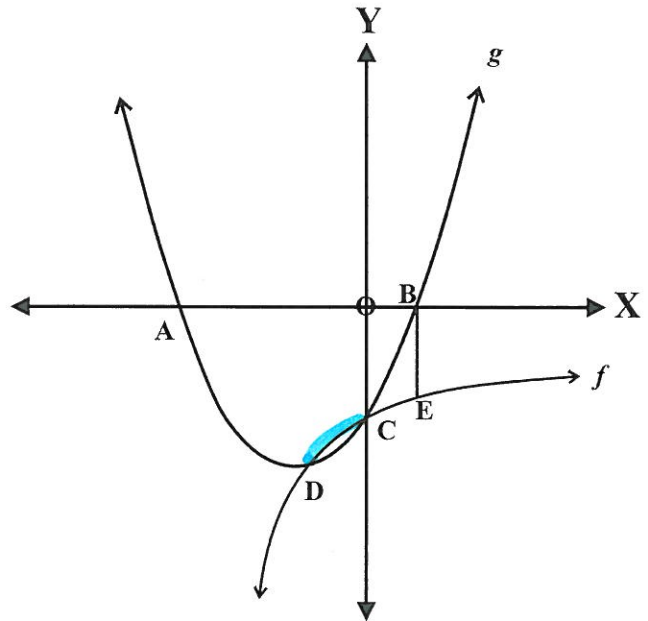
Vraag 10: [13]

$$f(x) = -a^{x+p} - 2$$

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

D is die draaipunt van g .

$BE \perp x$ -as



- 10.1 Bepaal die lengte van AB. (3)
- 10.2 Bepaal die koördinate van D. (2)
- 10.3 Bereken die waardes van a en p . (3)
- 10.4 Bepaal die lengte van BE. (3)
- 10.5 Skryf die vergelyking neer van $h(x)$ as $h(x)$ die refleksie is van $f(x)$ in die y -as. (1)
- 10.6 Bepaal vir watter waarde(s) van x sal $f(x) > g(x)$. (1)

10.1. A en B $\rightarrow$ g se x -afs ($y=0$)

$$\therefore x^2 + 2x - 3 = 0$$

$$(x+3)(x-1) = 0$$

$$x = -3 \quad \text{of} \quad x = 1$$

$$A(-3; 0)$$

$$B(1; 0)$$

$$\therefore AO = 3$$

$$OB = 1$$

$$\therefore AB = 4$$

10.2 Draaipunt D: $[g(x) = x^2 + 2x - 3]$

$$x = \frac{-b}{2a}$$

of

$$x_c = \frac{x_1 + x_2}{2}$$

$$= \frac{-(2)}{2(1)}$$

$$= \frac{-3+1}{2}$$

$$x_c = -1 \quad \checkmark$$

$$x_c = -1$$

$$y = (-1)^2 + 2(-1) - 3$$

$$= 1 - 2 - 3$$

$$y = -4 \quad \checkmark$$

$$\therefore D(-1; -4)$$

10.3 $f(x)$ gaan deur C en D $(-1; -4)$
C is die y-afs van $g \rightarrow C(0; -3)$

$f(x)$:

$$\therefore y = -a^{x+p} - 2 \quad \text{deur } C(0; -3)$$

$$-3 = -a^{0+p} - 2$$

$$-1 = -a^p$$

$$1 = a^p$$

$$a^0 = a^p$$

$$\therefore p = 0 \quad \checkmark$$

$$\text{en } y = -a^{x+p} - 2 \quad \text{deur } D(-1; -4)$$

$$-4 = -a^{-1+0} - 2$$

$$-2 = -a^{-1}$$

$$a^{-1} = 2$$

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

$$\therefore a = \frac{1}{2} \quad \checkmark$$

$$\therefore f(x) = -\left(\frac{1}{2}\right)^x - 2$$

$$10.4 \quad BE \rightarrow x=1 \quad B(1;0)$$

vervang $x=1$ ✓ in $f(x)$

$$\therefore g(1) = y = -\left(\frac{1}{2}\right)^1 - 2$$

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

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

$$\therefore BE = 2\frac{1}{2} \quad \checkmark \quad \text{een hede}$$

$$10.5 \quad h(x) = f(-x)$$

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

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

$$\therefore h(x) = -2^x - 2 \quad \checkmark$$

$$10.6 \quad -1 < x < 0 \quad \checkmark$$