



Junie-eksamen, Vraestel 1 2023 – Memorandum

Vraag 1

1.1 Vereenvoudig volledig, sonder die gebruik van 'n sakrekenaar:

1.1.1
$$-(-\sqrt{2} + 1)^2 - \sqrt{50} \quad (3)$$

$$= -(2 - 2\sqrt{2} + 1) - 5\sqrt{2}$$

$$= -2 + 2\sqrt{2} - 1 - 5\sqrt{2}$$

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

1.1.2
$$\left(\frac{16}{81x^{-2}}\right)^{-\frac{1}{2}} \quad (3)$$

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

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

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

$$= \frac{9}{4x}$$

1.1.3
$$\frac{4 \cdot 2^{-x-2} + 8 \cdot 2^{2-x}}{2^{-x-1}} \quad (3)$$

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

$$= 66$$

1.2 Indien $\frac{\sqrt{12}-\sqrt{18}}{\sqrt{80}} = \frac{2a-3b}{20}$, bereken ab in sy eenvoudigste wortelvorm. (5)

$$\frac{2\sqrt{3}\sqrt{3}-3\sqrt{2}\sqrt{2}}{4\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{15}-3\sqrt{10}}{20}$$

$$= \sqrt{15} \times \sqrt{10}$$

$$= \sqrt{150}$$

$$= 5\sqrt{6}$$

1.3 Die wortels van 'n kwadratiese funksie $f(x) = 0$ word gegee as:

$$x = \frac{24 \pm \sqrt{570-10p}}{30}; p \in R$$

1.3.1 Vir watter waarde(s) van p sal die wortels van $f(x)$ gelyk wees? (2)

$$\Delta = 0$$

$$570 - 10p = 0$$

$$570 = 10p$$

$$p = 57$$

1.3.2 Bepaal die waarde(s) van p waarvoor die wortels van $f(x)$ reëel en ongelyk sal wees. (2)

$$\Delta > 0 \checkmark$$

$$570 - 10p > 0$$

$$570 > 10p$$

$$p < 57 \checkmark$$

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Vraag 2

2.1 Los op vir x :

2.1.1 $x^2 = -6x$ (3)

$$x^2 + 6x = 0 \checkmark$$

$$x(x + 6) = 0 \checkmark$$

$$x = 0 \text{ of } x = -6 \checkmark$$

2.1.2 $2x^2 - 5x = 7$ (4)

$$2x^2 - 5x - 7 = 0 \checkmark$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-7)}}{2(2)} \checkmark$$

$$x = 3,5 \checkmark \text{ of } x = -1 \checkmark$$

2.1.3 $3 \cdot 2^{2x} = 12 \cdot 2^{-x}$ (3)

$$3 \cdot 2^{3x} = 12 \checkmark$$

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

$$3x = 2$$

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

2.1.4 $12 \geq 2x^2 + 2x$ (4)

$$0 \geq 2x^2 + 2x - 12 \checkmark$$

$$0 \geq x^2 + x - 6$$

$$0 \geq (x + 3)(x - 2) \checkmark$$

$$-3 \leq x \leq 2 \checkmark \text{ grense}$$

2.1.5 $a^{x+y} \cdot a^{2x} + \frac{1}{a^{-3x}} = \frac{a^y + 1}{a^{-(x+4)}}$ (6)

$$a^{3x+y} + a^{3x} = a^{x+4}(a^y + 1)$$

$$a^{3x}(a^y + 1) = a^{x+4}(a^y + 1)$$

$$a^{3x} = a^{x+4}$$

$$3x = x + 4 \checkmark$$

$$2x = 4$$

$$x = 2 \checkmark$$

2.1.6 $\sqrt{x^2 + 11} = x + 1$ (3)

$$(\sqrt{x^2 + 11})^2 = (x + 1)^2$$

$$x^2 + 11 = x^2 + 2x + 1 \checkmark$$

$$0 = 2x - 10$$

$$x = 5 \checkmark$$

$$2.1.7 \frac{x-1}{2x-1} - \frac{2}{4x^2-1} = \frac{7}{2x+1} \quad (6)$$

$$\frac{x-1}{2x-1} - \frac{2}{(2x-1)(2x+1)} = \frac{7}{2x+1}$$

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

$$2x^2 - x - 1 - 2 = 14x - 7$$

$$2x^2 - 15x + 4 = 0$$

$$x = \frac{-(-15) \pm \sqrt{(-15)^2 - 4(2)(4)}}{2(2)}$$

$$x = 0,28 \text{ of } x = 7,22$$

2.2 Los op vir x en y , indien:

$$x - y + 1 = 0 \text{ en } x^2 - xy + y^2 = 57 \quad (7)$$

$$x = y - 1 \dots (1)$$

Stel (1) in (2):

$$(y-1)^2 - y(y-1) + y^2 = 57$$

$$y^2 - 2y + 1 - y^2 + y + y^2 = 57$$

$$y^2 - y - 56 = 0$$

$$(y-8)(y+7) = 0$$

$$y = 8 \text{ of } y = -7$$

$$x = 7 \text{ of } x = -8$$

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Vraag 3

3.1 Bepaal die algemene term vir elk van die volgende patrone:

$$3.1.1 \frac{2}{3}; 1; \frac{8}{7}; \frac{11}{9}; \frac{14}{11} \dots \quad (2)$$

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

$$3.1.2 10 \times 11; 15 \times 22; 20 \times 33; 25 \times 44; \dots \quad (2)$$

$$T_n = (5n+5) \times 11n$$

3.2 Gegee: 3; 14; 3; 18; 3; 22; 3; ...

3.2.1 Skryf die volgende twee terme in die ry neer. (2)

$$26; 3$$

3.2.2 Bepaal die waarde van die 42ste term in die ry. (3)

$$T_n = 4n + 10$$

$$T_{21} = 4(21) + 10$$

$$T_{21} = 94$$

3.3 Beskou die reeks: 3; x ; 10; y ; 21. Die reeks het 'n konstante tweede verskil van 1. Bepaal die n^{de} term van die reeks. (8)

1ste verskille: $x - 3$; $10 - x$; $y - 10$; $21 - y$ ✓

2de verskille: $10 - x - (x - 3)$; $21 - y - (y - 10)$ ✓

$10 - x - x + 3 = 1$ ✓

$-2x = -12$

$x = 6$ ✓

$2a = 1$

$3\left(\frac{1}{2}\right) + b = 6 - 3$

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

$a = \frac{1}{2}$ ✓

$b = \frac{3}{2}$ ✓

$c = 1$ ✓

$T_n = \frac{1}{2}n^2 + \frac{3}{2}n + 1$ ✓

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Vraag 4

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

4.1 Skryf die vergelyking van die asimptoot van k neer. (1)

$y = -2$ ✓

4.2 Bepaal die koördinate van die sny punte van k met die x - en y -asse. (4)

$k(x) = \left(\frac{1}{4}\right)^0 - 2$ ✓

$k(x) = -1$

$\therefore (0; -1)$ ✓

$0 = \left(\frac{1}{4}\right)^x - 2$ ✓

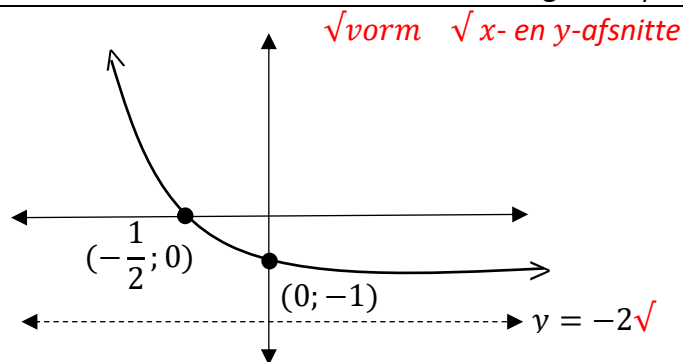
$2 = (2^{-2})^x$

$1 = -2x$

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

$\left(-\frac{1}{2}; 0\right)$ ✓

4.3 Skets die grafiek van k en toon alle afsnitte met die asse en enige asimptote. (3)



4.4 Skryf die vergelyking van $h(x)$ neer, indien $h(x)$ gevorm word deur $k(x)$ in die y -as te reflekteer en daarna 1 eenheid op te skuif. (2)

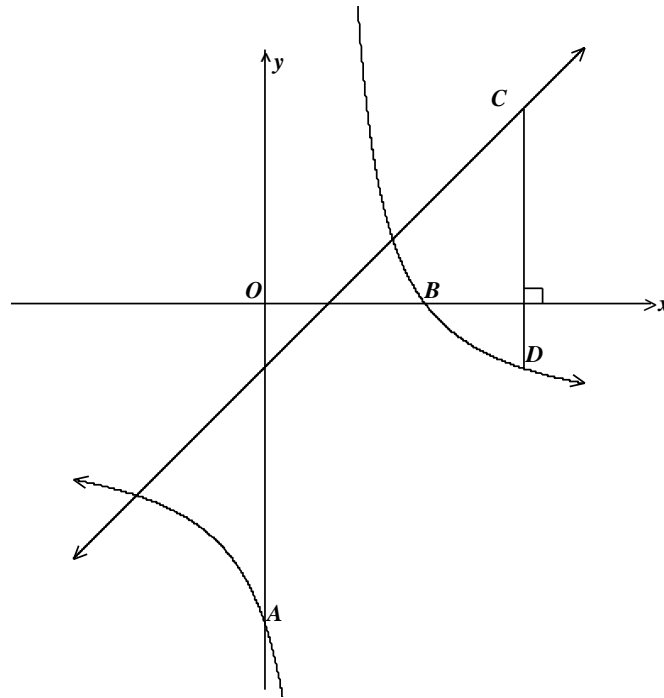
$$k(-x) + 1 = \left(\frac{1}{4}\right)^{-x} - 2 + 1$$

$$h(x) = \left(\frac{1}{4}\right)^{-x} - 1 \checkmark$$

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Vraag 5

Gegee: $r(x) = \frac{6}{x-1} - 3$ en $s(x) = x - 2$:



5.1 Bereken die koördinate van A en B. (4)

$$y = \frac{6}{0-1} - 3 \checkmark$$

$$y = -9$$

$$A(0; -9) \checkmark$$

$$0 = \frac{6}{x-1} - 3 \checkmark$$

$$3 = \frac{6}{x-1}$$

$$3x - 3 = 6$$

$$3x = 9$$

$$x = 3$$

$$B(3; 0) \checkmark$$

5.2 Skryf die waardeversameling van r neer. (2)

$$y \in R \checkmark; y \neq -3 \checkmark$$

5.3 Bepaal die vertikale lengte van CD , indien die koördinate van D $(6; y)$ is. (3)

$$CD = (6 - 2) - \left(\frac{6}{6-1} - 3\right) \checkmark$$

$$CD = 5,8 \text{ eenhede} \checkmark$$

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Totaal: [90]